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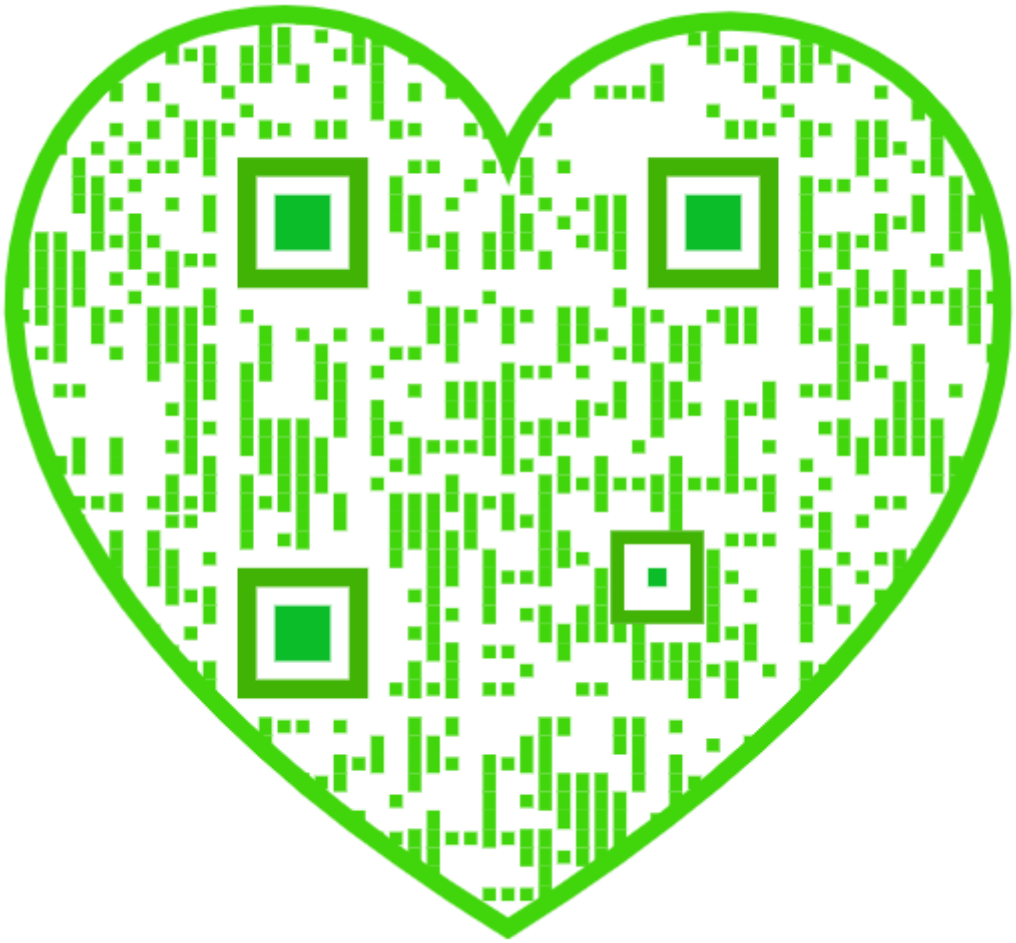

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ABDOMINAL TUMOURS

DIAGNOSIS

AND

SURGICAL TREATMENT

OF

ABDOMINAL TUMOURS

By SIR SPENCER WELLS, Bart.

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PREFACE

THE book which I have now written is in many respects a new work, though it may be called a fourth edition of the first published in 1865. Twenty years have entirely changed the boundaries of the subject. Before 1860, ovariotomy sometimes succeeded, as often failed, and was very generally discredited. My first book was a record of cases, showing how difficulties were overcome, how principles were gradually brought into view, how rules of practice were established, and what results might be obtained. It silenced objections, and encouraged others to follow in the same course. My second book, in 1872, was no longer a plea for ovariotomy. An experience of 500 cases, which then seemed large, made me feel that, though I was still a learner, there was something I could usefully teach, and had no right to withhold. According to the views then held, I went into the diagnosis of ovarian disease and into the details of ovariotomy. There is evidence enough that my example and teaching were not unfruitful. Ten years more brought into the field many co-labourers who tilled the ground I had partially cleared, and no one is more ready than I am to acknowledge the value of what they have done, and to rejoice over the relief they have given to a multitude of sufferers. My own experience had more than doubled, some of my views had changed, in some respects my practice was modified, and I had information acquired from others to add to my own observations. The subject had expanded. Uterine pathology and surgery had been grafted upon that of the ovary, and my third book, in 1882, included both. Since that time the 'domain of abdominal surgery' has not only spread over every abdominal organ, but has been taken possession of with equal zeal by the profession throughout the civilised world. The proof of this, so far as I am concerned, is that in less than two years a new edition of my last book is called for. I have adopted a new form, and issue it at a price which puts the information it contains at the command of every student. Suppression and condensation have enabled me to bring this work into smaller compass, and have also enabled me to make considerable additions on various conditions which call for the performance of abdominal section. Details which were interesting when novelties have been omitted. My time has been too fully taken up as a practical surgeon for me to do much as a pathological explorer. Researches in ovarian pathology have been too limited and the facts collected

too few, for any but the most empirical conclusions. There are laws of disorder, degeneration, and decay as well as laws of evolution, development, and function. It must be by reasoning on the facts gathered together, by a survey of all the corresponding structures and diseases through the whole series of organic life, that we shall arrive at some solution of the problems of ovarian pathology. Fortunate it is for humanity that the art of relief is somewhat independent of scientific generalisations. Some observers maintain that ovarian disease is an affair of race—that it is much more common in Great Britain and Germany than in France or Spain. If it be so, there is a special call upon British pathologists to do as much in the way of studying causes and prevention as British surgeons have done by way of cure; and I would repeat the hope which I expressed in 1882, in the preface to the third edition, 'that the pathological industry of those who are not overwhelmed with the routine of mere clinical labour will bring us to such an understanding of the origin, causes, and nature of these diseases as will give us the means of arresting their development and progress, and will shield us from the reproach of being able only to offer the ultimate resource of relief by excision.'

In condensing I have expunged nothing of practical value, and perhaps have made some points more clear than they were. The additions are large, and naturally arise out of the growth of the subject. Never a mere ovariotomist, I have followed, and sometimes led, the advance of abdominal surgery, and this new edition or new book now includes the operative treatment of various kinds of tumours—splenic, renal, hepatic, and others—hardly noticed in my earlier books.

But there is one fact which stands out with ominous significance in all these records. Whatever may be our diagnostic accuracy and our operative skill, our success in the treatment of these diseases is fatally restricted by the influence of septicæmia. We have already reached as great an amount of success in the results of ovariotomy as can reasonably be hoped for, and shall in like manner approach such success in the results of the extirpation of other organs. But until we find some more certain protection for our patients against the ravages of septicæmia than any antiseptic precautions hitherto taken secure, abdominal surgery, though not without just claim to the credit of having done good service to humanity, must still be looked upon as a branch of our science and art which, still imperfect, calls for continued search for truth, and for constant efforts to improve methods of practice, from every surgical student.

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April 1885.

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DIAGNOSIS AND SURGICAL TREATMENT

OF

ABDOMINAL TUMOURS

PART I.

OVARIAN AND ALLIED TUMOURS—THEIR DIAGNOSIS AND SURGICAL TREATMENT

CHAPTER I

CLASSIFICATION OF OVARIAN AND ALLIED TUMOURS—THEIR DIAGNOSIS—DIAGNOSIS OF ADHESIONS—THE PEDICLE—ROTATION OF THE PEDICLE

Abdominal and pelvic tumours connected with the female organs of generation may be classified in the following manner:

OVARIAN TUMOURS

Simple and multilocular cysts—of follicular origin.

Proliferous cysts—of epithelial origin.

Sarcomatous tumours—of connective-tissue origin.

Fibrous tumours—of fibre-cell origin.

Hypertrophy—excess of growth of some or all of the tissues.

Malignant tumours—degeneration of one or all of the tissues.

EXTRA-OVARIAN TUMOURS

Cysts of parovarium—of epithelial or tubular origin.

Cysts of broad ligament—origin, connective-tissue cells or ova.

Cysts of Fallopian tubes—origin, ova, epithelium tissues; by occlusion.

Cysts of subperitoneal tissues—connective-tissue cells.

Cysts developed from aberrant ova—of ovarian follicular origin.

The ovary is no exception to the universal law of development. It begins with a cell. The combined progeny of the primitive cell is as diverse, and subject to as many deviations from natural growth and action, as any other cell structure. Each series of cells may go wrong separately; a few series of cells may go wrong together and entrain the rest, or the whole may go wrong at the same time. It is easy to understand how, by continued development, from a diseased reproductive cell we may have a simple or multilocular cyst; from endothelium, a papilloma; from a group of connective tissue cells, a sarcoma; from fibre cells, a fibroma; and with partial or general degeneration of the tissues, some form of malignant tumour. In the same way, we trace the origin of extra-ovarian cysts and tumours to the histological elements of the tissues in which they appear, the structural characteristics depending upon the nature of the cell point of departure.

MODES OF EXAMINATION OF THE OVARIES

Absence of the ovaries, from their imperfect development or atrophy, may occasionally be inferred from some physical peculiarities or physiological aberrations; and the presence of an accessory ovary, now and then observed, may probably account for the recurrence of menstruation in spite of disease, or after the removal of two by ovariotomy.

The manipulation in the examination

of the congenital or accidental displacements of the ovaries requires skill and care. The ovaries may generally be felt in their normal position on either side of the uterus, a little below the brim of the pelvis, between one finger passed upwards in the vagina and another pressed downwards from the abdominal wall. It is only in cases of firm vagina, or very tense or thick abdominal wall, that the ovaries cannot be made out.

In order that this examination may be done effectually, the patient should be made to lie on her back, with the shoulders and knees raised so as to relax the belly, and both bladder and rectum must be empty. It is only by combined internal and external examinations that a normal ovary, or one only slightly enlarged, can be detected. External examination alone is fruitless. By vaginal examination alone a resisting body may perhaps be felt through the upper part of the vault of the vagina: its mobility may be recognised, but nothing more. Sometimes the ovaries are so easily displaced that they elude internal examination alone. Yet two fingers brought together, one from without and one from within, may fix and feel the ovary between them. It is well first to find the fundus uteri and to steady it by one or two fingers, and then by the combined examination an ovary is found near the uterus, on one side of it. The finger can be passed around it, and it may be pushed from before backwards, and less easily towards and away from the side of the uterus. It has a firm elastic feel, glides easily under the fingers, and unevenness of the surface may often be detected.

A small hard mass of fæces in the bowel, a swollen pelvic gland, a cyst in the broad ligament, a dilatation of the Fallopian tube, or a small pedunculate outgrowth from the uterus might give a similar impression to the examining fingers, but after some practice this will not be mistaken for the characteristic feel of the ovary.

The right ovary is most easily reached by one or two fingers of the right hand in the vagina, the left hand being on the abdomen; the left ovary by the left hand being used for the vagina, and the right for the outside.

Examination by the rectum is in some cases more, in others less, useful than by the vagina. Occasionally, when the rectum is large and the vagina tense, one or both ovaries may be distinctly felt by the rectum and not by the vagina. In some cases, when the ovaries can be readily felt by the vagina they cannot be touched by the rectum. Even in the case where the ovary is abnormally situated in Douglas's space it may be palpable through the posterior wall of the vagina, and the fingers of the hand compressing the abdomen meet a finger in the vagina much more readily than one in the rectum. Examination both by rectum and vagina is necessary when an ovary, not enlarged, is supposed to be in Douglas's space, for Schultze has known a gland behind the rectum to be felt through the vagina and mistaken for an ovary.

It must be remembered in judging of the size of an ovary, that if small, and felt through a thick abdominal wall, it will appear to be larger than it is, and that ovaries of the same size felt through walls of different thickness may appear to be of different sizes. A little practice will be sufficient to teach what allowance should be made in face of this source of possible error.

A healthy ovary is generally insensible to moderate pressure. But touch may give pain when there is no reason to suspect inflammation or any other departure from a state of health. The diagnosis can only be made out when the swollen and painful ovary is felt as a circumscribed lump.

Schultze says he has observed that the displacement of the ovary during inflammation may rather be into Douglas's space than to the front of the uterus, and that on regaining its usual volume and sensibility it has returned to its natural position. In other cases after recovery it remains fixed; and once an ovary which had been adherent to the uterus after inflammation was months before it became again movable.

The displacements of the ovary recognised by this mode of double examination are all within the limits of the abdominal cavity; but the whole gland will sometimes find its way through the weak points of the parietes, and we have to deal with it as a form of hernia, either inguinal, crural, ischiatic, umbilical, ventral, or vaginal. Pott's case was one of simple hernia and abscission; but an ovarian cyst has formed outside the inguinal ring, and been the subject of an extra-mural

ovariotomy by a Spanish surgeon. An instance of this kind has not come under my notice, but I do not see that it can offer any difficulties to the operator.

DIAGNOSIS OF THE DIFFERENT KINDS OF OVARIAN TUMOURS AND THEIR ADHESIONS

Many of the signs and symptoms of the tumours classified in this chapter are common to the whole group. There are degrees of hardness and mobility; there are shades of force and sharpness in fluctuation; there are eccentricities of form and variations in relative position which in different cases alter the areas of resonance and dulness. But the physical signs, though often sufficient for diagnosis, are sometimes far from conclusive till we come to test the contents. With them we obtain additional evidence, and are able to declare in certain cases from what sort of cyst they are drawn. The symptoms of the tubercular and malignant tumours are a set apart.

With the cystic enlargements, simple and compound, there are from the first progressive uneasiness running on to distress, pain from nerve pressure and stretching, irritation from local congestion, and other effects purely arising from mechanical causes. But as the tumour grows bigger and encroaches on the various organs, functions are interfered with and suspended, the lines of innervation are cut or compressed, circulation and absorption are interrupted, nutrition is arrested, and the victim dies atrophied or suffocated. The evidence from mere symptoms is all along more circumstantial than specific, and assists rather in forecasting the end than in identifying any particular kind of cyst.

No time of life is exempt from ovarian tumours. They are found in infancy as well as in old age, though it is seldom that the development begins late. When seen in advanced life they are generally examples of longevity of the tumour no less than of the person. The greater part of my patients have come to me between the ages of 25 and 55, and the average age on my list of 1,000 cases of completed ovariotomy is as near as may be 39. This would seem to show that the condition of the generative function has a great deal to do with the origin of the disease. What Boinet says about childless women, that 'sur 500 femmes atteintes de kystes de l'ovaire, nous en avons trouvé 390 qui n'avaient jamais eu d'enfants,' points either to a cause or a consequence, and certainly to some connection between the two facts.

It has been said that the ovary of the right side is more frequently affected than the left. This statement is rather one of impression than of assurance. Both ovaries are often found diseased at the same time in different degrees. With this evidence of sequence, and with our knowledge of the sympathetic morbid action between twin organs, no question can be made as to the rule of practice, as accepted in ophthalmic surgery, to save one by cutting out the other; while it may be as wrong to cut out a sound ovary as a healthy eye.

A long duration of the disease is exceptional. Race and type yield equally to the same etiologic influences. M'Dowell soon fell upon cases among negresses as well as whites. My list is multicolor and cosmopolitan, and, if reports may be trusted, ovariotomists are never anywhere in want of subjects.

The discovery of a tumour in the abdomen is generally made by the patient herself. The question, What is it? is one for the surgeon. Having satisfied himself that he has an ovarian tumour to deal with, and putting aside the tuberculous and cancerous degenerations which are indicated by the general conditions, to him the points of primary importance are its seat, solidity, and relative freedom. He has to make out, if possible, the basic origin of this tumour, and what sort of pedicle it has, on which side it is attached, and whether it be single or double. It is possible that there may be a cyst of both ovaries. This I saw for the first time in a young lady whom I attended with Dr. Priestley. There was a distinct sulcus between the two cysts near the median line, and it became a question whether this was owing to disease on both sides or to the peculiar shape of a cyst on one side. It was supposed that the latter opinion was more probably true, because the catamenia were regular; but at the operation two free simple ovarian cysts were removed without difficulty. In one case the appearance leading to suspicion of both ovaries being diseased, depended on a deep sulcus in the cyst caused by the rotation of the tumour and the pull on the Fallopian tube. If the resonance of

intestine can be traced low down in front between two cysts, the probability of disease on both sides is strong.

The next questions are, whether the tumour is cystic or solid, or whether it is free or adherent; and if adherent, whether the adhesions are of such a character that they may be separated without risk, or so extensive and intimate that separation would be almost certainly fatal. On their solution depends the decision whether tapping should or should not be recommended; whether drainage should be tried, or whether ovariotomy would be the best practice; whether this operation could be done with more or less than the average chances of a good result; or whether the difficulties would be so great that it should not be attempted, even if the patient were herself anxious thereby to escape from her sufferings whatever the risk might be.

Solid tumours of the ovary are excessively rare. In two of the cases which I have seen, the tumours were surrounded by fluid in the peritoneal cavity, and it was only after removal of this fluid that the size and consistence of the body could be made out. Solid portions of large tumours which fluctuate in other parts are common enough, but general hardness and irregularity of form, with nodular masses cartilaginous or bony to the touch, almost indicate the dermoid character of the growth, especially in a fair and young patient.

When by internal and external examinations the outline of the tumour can be traced smooth and elastic over its whole extent, when the wave of fluctuation is equally perceptible in all directions and limited by the line of dulness on percussion, and the want of resonance is circumscribed, the inference is pretty clear not only that the tumour is cystic, but that it is practically unilocular.

This simple cyst, however, may be either ovarian or extra-ovarian. If in a young person it is either flaccid and of long duration, or excessively tense and of recent formation, the inference is almost equally clear that the cyst is extra-ovarian and the contents limpid. As this kind of cyst especially may be not only temporarily emptied, but emptied with some probability that the fluid will not collect again, it is interesting to ascertain if possible whether it is really single, or whether there may be one large cyst with smaller ones concealed. Two conditions may be accepted as proof that an extra-ovarian cyst is simple: first, that it has lasted for years with little damage to the health; or secondly, that it has formed with such rapidity as to be mistaken for ascites. In the first of these two conditions the cyst is generally flaccid, and there is little or no suffering beyond the inconvenience arising from its bulk. In the second, the cyst is tense, and there is the suffering which accompanies undue and sudden abdominal distension. Both are likely to be mistaken for ascites, but may be distinguished by the signs of the inclosure of the fluid in a cyst, enumerated in the next chapter.

With these simple cysts, whether of the ovary or not, the health is for some time but little affected. The first appearance is in much the same spot, the advance is similar, the form of the abdomen and the effect of change of position are not different. The fluctuation in both is limited, but to the touch the shock is not the same. It is as distinct in the one as in the other, but from the character of the fluid and the thinness of the walls in the broad-ligament cysts, the wave impression under percussion in them is more defined. Scarcely a trace of these tumours can be felt after tapping, so completely do the walls collapse. The fluid itself, in contrast with that from a true ovarian cyst, is thin, clear, odourless, and any coagulum formed by boiling is redissolved by boiling acetic acid. On this test the practitioner may mostly rely with safety, and found a reasonable hope that further proceedings will be unnecessary.

There are many cysts which, although practically unilocular, have on some part of the wall of the mother cyst, most commonly near the base, a group or groups of secondary cysts, which negative the supposition that the tumour is extra-ovarian, and the contents instead of being limpid will in many instances prove to be viscid. Multilocular cysts are sometimes as uniform in outline as simple cysts, but as a rule their surface is more or less irregular from the unequal development of their component parts; and the projection of the different compartments can be both felt and seen. These projections vary in hardness, and when the resistance of the cyst wall to pressure is considerable, when the fluctuation is limited by the divisions between the cavities, and its wave is slow

and doubtful, the probability is that the cyst wall is thick and the contents colloid. A septum must be very thin which does not intercept the wave of fluctuation, but in some cases of colloid tumours, where the septa are imperfect, the impulse of the percussed fluid is almost as distinct and instantaneous as in a true unilocular cyst.

Boinet believes that the colour and consistence of the contents of multilocular cysts may be predicted before tapping. The progress of the disease, the signs of inflammation more or less acute and repeated, and the state of the health, will be sufficient to indicate if the contents are serous or purulent, and what their colour may probably be. When abdominal pains have been frequent, and the abdomen is tender on pressure, it is probable that, whether the cyst is unilocular or multilocular, the contents will be sero-sanguinolent. When the temperature ranges from 100° or 101° in the morning to 103° or 104° at night, and emaciation is progressive, appetite lost, thirst troublesome, sleep disturbed, nausea or vomiting distressing, and the abdomen tender on pressure, with hurried pulse and respiration, it is probable that one or more of the cysts may contain pus; and that, when these symptoms are present in an extreme degree, or have lasted for a considerable period, the pus has become fetid. Blood may be found in one or more of the cysts, either as an immediate result of twisting of the pedicle, or as a more slow and gradual oozing from degenerative changes.

When any considerable amount of blood has been poured into the cavity of an ovarian cyst, all the well-known signs of internal hæmorrhage are observed. I have twice seen sudden death occur in this way. In one case five pounds of blood and clot were removed from the cyst into which they had been suddenly poured from a large vein. In the second case the blood passed into the peritoneal cavity. Another patient died, but not immediately, of bleeding through the Fallopian tube and uterus from a large cyst of the left ovary.

ADHESIONS

In the early days of ovariotomy great pains were taken to ascertain whether a tumour was free or adherent, and if extensive adhesions to the abdominal wall were believed to exist, ovariotomy was considered to be improper or impracticable. Mr. Walne, in 1843, began his operations with a small incision just large enough to enable him to ascertain with his finger whether the cyst were free or not. Dr. Frederick Bird published a great number of cases in which he made an exploratory incision, and abandoned the operation as soon as he found that the adhesions were intimate. He was so anxious to ascertain the presence or absence of adhesions that, even before making an exploratory incision, he used to insert needles through different parts of the abdominal walls into the cyst, believing that by watching the movements of these needles, as the patient inspired and expired, he could make out whether the cyst shifted its place beneath the abdominal wall or not. Others marked the deviations of the cannula after tapping, with the same intention and belief, only to find that all these signs were fallacious.

Before I had operated on any considerable number of cases, I began to doubt whether adhesions seriously affected the result of the operation, and on analysing the first 500 cases, arrived at certain conclusions, to be found in the fifth chapter. The experience of the second 500, and of my first 1,000, as a whole, afterwards modified these conclusions, and proves that it is a matter of some interest to know what are the signs by which a free or an adherent cyst may be recognised. To make this examination the patient should be placed in a good light, lying on her back, with the shoulders and knees somewhat raised, and the whole abdomen uncovered. By watching the abdominal movements during deep inspiration and full expiration, a free ovarian cyst may be seen, providing the abdominal wall is not too thick, moving upwards and downwards with every breath. Irregular elevations and depressions on the surface of the cyst make its free mobility perfectly manifest and indubitable; but when the surface is uniform it is only the upper border of the cyst which can be seen to move, and to avoid deception it may be necessary to ascertain by percussion how high the outline extends above the umbilicus; because the transverse colon, following the respiratory movements, may be easily mistaken for a moving cyst. A thick abdominal wall may obscure the movements of the cyst during inspiration and expiration, but it is quite easy to follow them by the varying position of the

dull sound of the cyst and the clear sound of the colon under percussion.

The dull sound at the upper boundary of the cyst will often descend from one to two inches during inspiration, and rise during expiration, just as the cyst is seen to move in patients where the abdominal wall is thin. With close adhesions to the abdominal wall no such freedom of motion can be observed, nor is it possible. The cyst and the abdominal wall must move together unless the adhesions are loose. I have three or four times seen cases where the cyst moved freely beneath the abdominal wall, but in which very firm adhesions had to be separated, these adhesions consisting of flattened cellular bands or cords of fully an inch in length. My belief is that such bands of adhesion have been elongated by the free motion of the cyst, before the lymph forming the connection had been thoroughly organised or hardened. Once aware of this source of fallacy, it is easy to check it by placing the hands flatly on the abdomen while the patient breathes, when any long bands of adhesion give a sensation of grating or crackling to the hand, which can only be mistaken for the rubbing of recent lymph, or for the presence of omentum in front of the cyst. With this sensation of crepitus, friction sounds are always audible, and the concurrence was formerly supposed to be an evidence of adhesion by lymph recently effused upon the peritoneal surface of the cyst, or upon the peritoneum in apposition with the cyst. But this is an error. So long as the friction can be felt or heard, movement must be free. As soon as adhesion takes place friction ceases, and can only be felt again if the lymph which forms the connecting medium becomes so stretched that motion again becomes possible between the cyst and the abdominal wall. It is common for crepitus to be present for a time, and to disappear without any adhesion, the lymph being removed and the surface of the peritoneum again rendered smooth. The crepitus which is produced by the presence of omentum between the cyst and the abdominal wall may be mistaken for that caused by recent lymph or old stretched adhesions, but it is not impossible to distinguish them with tolerable certainty. With omentum there is a softer and more doughy feel, and it is seldom present over any part of a cyst not near some intestine. This is easily recognised by its resonance on percussion and its gurgling under pressure, and there is neither the tenderness nor feverishness which accompany the recent effusion of lymph.

This interesting point in the diagnosis of adhesions presented itself to me some years ago. A tumour, which had not been tapped, was observed to move very freely beneath the abdominal parietes on deep inspiration, and I therefore expected to find it non-adherent. But at the operation on June 13, 1864, firm adhesions anteriorly and in the right iliac fossa, sufficiently long to admit of the cyst moving freely, and an extensive surface of adherent omentum, were separated by the hand with some difficulty, and a close adhesion to the fundus of the bladder required careful dissection.

The action of the recti abdominales varies with the different conditions of ovarian tumours, and should be brought into view by directing the recumbent patient to try and sit up without assisting herself by her hands or elbows. This effort puts the recti in strong action, and if a tense ovarian cyst is free from adhesion, it falls backwards and to the sides, while the muscles form a projecting ridge in the centre of the abdomen. The same appearance is seen in cases of adherent cyst only when it is flaccid or partially empty.

The umbilicus is not affected by the movements of a free ovarian cyst during respiratory action, or when pushed in various directions. But any movement communicated to a cyst which adheres to the front of the abdominal wall is immediately followed by a corresponding movement of the navel.

But while slight adhesions to the abdominal wall are not much regarded in ovariotomy, adhesions low down in the pelvis are, on the contrary, of great importance. The difficulty is to separate them without injury to the rectum or the bladder, or the ureters, or to large blood-vessels or to nerves, and it is not easy to find every bleeding vessel or to stop the loss of blood. When deep seated and very intimate, the dissection necessary is out of the question in the living patient, and gives no small trouble after death. Such a condition may be suspected, especially after tapping, when placing the patient on her elbows and knees, with the pelvis raised and the thorax depressed, the lower portion of the tumour can be felt unyielding by the finger

through the vagina or rectum, and the uterus is either pulled up out of reach, or pressed backwards or forwards or to either side, while its mobility is considerably restricted.

But it is quite possible that the lower portion of an ovarian tumour may be jammed downwards and moulded into the pelvis without becoming attached. Then in the same position some force with the finger will dislodge it and show that it is not bound down by adhesions. I have operated on an ovarian tumour thus simply impacted in Douglas's space with the uterus thrust upwards out of the pelvis. Both ovaries were diseased, and though there were no adhesions, one cyst was prevented from rising by the other. They were successfully removed. It is curious in such cases to hear the rush of air into the hollow when the lower portion of the cyst is pulled away from the sacrum. The air passes down with a gurgling sound, and the tumour is brought away with no more than the ordinary difficulty.

Adhesions to the liver, stomach, or spleen can never be accurately made out before operation. Sometimes a coil of intestine can be distinctly traced, always remaining attached to the same part of the cyst wall. Further than this, adhesions to the abdominal viscera can only be ascertained after the operation has been commenced.

THE PEDICLE

For the sake of convenience, the attachment of ovarian cysts and tumours to the part from which they spring, whether long, narrow, and cord-like, or short, thick, and broad, may be considered under the common designation of pedicle. It consists of the Fallopian tube often much elongated, the broad ligament often considerably thickened, the utero-ovarian ligament in some cases hypertrophied into a large fibroid stem, and the round ligament. The round ligament may be so convoluted that a double curve of it is included in the pedicle, but it is often quite free. Occasionally the utero-ovarian ligament and the Fallopian tube are not connected by the broad ligament; a considerable space may intervene between them, so that they appear as two pedicles to one tumour. The pedicle contains large blood-vessels; every now and then the veins are so large and distended that they resemble the intestines of a rabbit. In all cases of ovarian tumour the arteries are branches from those which supply the ovary itself, and the veins have the tortuous distribution peculiar to the plexuses of this part. The size of these vessels, when adhesions do not materially contribute to the supply of nourishment, is mostly in proportion to the bulk of the tumour; but oftentimes their volume is inexplicably large, and accounts for the rapid loss of blood when ruptured or divided. Numerous lymphatics, after a devious course and many inosculations passing between the ovary, the tube, and the broad ligament to the lumbar plexus, are also inclosed in the pedicle. Nerves of considerable size accompany the vessels. I have seen a nerve quite as large as the radial in a part of the pedicle left above the clamp. The tissues mixed up with the other components of the pedicle are histologically the same as those of the coats of the tumour—a species of imperfect connective and fibrous tissues, the chief elements being single white fibres, numerous fusiform embryonic fibres, and elliptical round cells or granules, the whole strongly contractile, coherent, and bound together by an envelope of peritoneum. In many cases, especially where the disease assumes the colloid form, the pedicle becomes implicated, is soft in texture, and easily broken through. In others it becomes the seat of numerous proliferous outgrowths or papillary excrescences. In its ordinary form it is extensible, and of variable length and thickness. When elongated, it may form attachments to the surrounding parts, and sometimes is the cause of strangulation of intestine. It is not often that it is seen so long as in Case 603, where it measured more than one foot, and was accompanied throughout by the Fallopian tube. In Case 844 it was more than the usual length, and had a band of adhesion stretching across to a coil of intestine. This I ligatured before putting on a clamp to the pedicle. There are also instances of duplicate pedicles. I need only cite two or three cases among my last five hundred. In one case (502) the pedicle was in two divisions with intestine between them. Two distinct pedicles supported the cyst in Case 927, but the tube only was tied. The patient did well. In Case 841, I met with the singular complication of four cysts for which there were four pedicles.

ROTATION OF THE PEDICLE

A long pedicle allows free scope to the disposition which these tumours have to turn upon themselves, and is then the source of important complications. In 1865 Rokitansky published a paper on 'The Strangulation of Ovarian Tumours by Rotation.' The tumour turns upon its axis, and the pedicle is twisted sometimes as much as two or three times round. The occurrence is not at all rare. Rokitansky has given the particulars of thirteen cases, eight of which he found in making autopsies after fifty-eight deaths from ovarian disease. The same thing has been observed during my operations in more than twenty cases, and no doubt it has in others escaped notice. In two cases it caused death before operation.

The direction of this rotation is not at all constant; sometimes being inwards towards the median line, sometimes the reverse, outwards. The tumour may also rotate obliquely, turning over backwards or forwards. In outward rotation the Fallopian tube, if not adherent to the tumour, becomes spiral round the pedicle; if adherent, round both tumour and pedicle. In inward rotation, the first half turn pushes the tube inwards and backwards. Should the rotation continue, then the tube forms a spiral round the back of the tumour. Or it may be altogether exempt from participation in the turning. The uterus is pulled in the direction of the rotation, and in one case (106) it was so much drawn out of its place that I was led to suppose I should find close adhesions, which, however, did not exist. These movements seem occasionally to take place suddenly and quickly; but they are gradual in other cases; may be reversed, and recur. Where the rotation is not complete, the motion may become, as it were, slowly oscillating. The pedicle sometimes gives indications of these changes having taken place repeatedly; and general symptoms, such as sudden accession or increase of pain, change of other sensations from altered relative position of the tumour and viscera, and perhaps some difference in the external contour of the belly, may enable us to conjecture the time of commencing rotation.

But if the pedicle has become twisted, and no unwinding of it follows, what may be the consequences? The great veins are compressed, and blood continues to pour in by the arteries. Congestion, exudation of serum, extravasation of blood into the cysts, and rupture follow in rapid succession; and, unless timely relief is afforded by ovariotomy, the patient soon sinks. If the rotations are so complete as to strangulate the arteries of the pedicle, gangrene is inevitable. But supposing the revolving of the tumour to be accomplished more tardily, nutrition is only impeded, and the more happy result of shrivelling of the walls of the tumour, with absorption of the contents, may occur. The remains of such tumours have been found sometimes in Douglas's space as a hard, solid, partly cartilaginous substance. Inflammatory adhesions binding down the pedicle have also, without twisting, brought about the atrophy of an ovarian tumour. In other instances, the constriction of the vessels by the change of position is so moderate that the tumour itself is not much affected, but it remains stationary, contracts adhesions to some of the viscera, and cannot be replaced. Rokitansky mentions one case in which a strong cord-like band so compressed the sigmoid flexure of the colon that the slightest change of position rendered it impermeable. The bowel has also been so entangled with a long pedicle, during rotation, as to become strangulated. The immediate performance of ovariotomy might be rendered necessary, under such circumstances, for the release of the compressed and obstructed intestine. Even after new vascular alliances have been formed between the rotated tumour and the omentum or viscera, the pedicle has by some means, either tension or pressure, been divided. In such a state of transplantation, the tumour has drawn its nutriment through the newly formed vessels of the plastic adhesions, and its parasitic existence has not been much less vigorous than before. Several examples of these self-grafted tumours have come under notice among my ovariotomies. In the operation in Case 110 there was no adhesion of the cyst to the abdominal wall, but the omentum was strongly attached to the upper part of the cyst, and interlaced with mesentery from below. I tapped several large cysts successively, got the tumour out, and then found there was no pedicle. It appeared that the tumour derived its vascular

supply solely from the omental and mesenteric vessels. The fundus of the uterus felt rough, but there was no tear nor fracture at the point where the Fallopian tube must have separated, nor was there any bleeding; there was pretty free hæmorrhage from the omental vessels. I cut away some shreds of omentum, and tied at least twelve vessels with very fine silk, cutting off both ends of the ligatures close, and returning the omentum with the tied vessels into the abdomen. The other ovary was found in its natural position, but enlarged and diseased. It too was removed, and the patient was soon fully re-established in health, and lived till the year 1878. Another instance (Case 419) was that of a woman thirty-eight years of age, with five children, who for eighteen years, and through all her pregnancies, had carried a dermoid cyst. When two months advanced in pregnancy (May 1871) I operated on her without hindrance to the gestation. The tumour being dermoid, its contents would not pass through the trocar, but gushed out from the puncture. The cyst was then drawn out, large shreds of very vascular omentum and a coil of intestine growing to it. On separating the omentum and intestine, it was found that there was no pedicle. The blood supply of the cyst had been kept up by the omental vessels, and some large vessels near the cæcal appendix, where the intestine appeared thick and contracted. Several vessels and shreds of omentum were tied, and returned with the ligatures cut off short. At the full term of pregnancy a living child was born, after a natural labour, in December 1871. The patient was well in 1872, but in 1881 suffered from pulmonary disease, which afterwards proved fatal.

It is very easy to understand that an ovarian tumour of almost any size, provided the pedicle be long and the tumour be free from adhesion, may rotate and form one, two, or more complete twists of the pedicle. I have several times unrolled the pedicle before applying a clamp or ligature, turning round the tumour three or four times before it was set right—although there had been no such stoppage of the supply or return of blood as to have affected in any remarkable degree the nutrition or appearance of the tumour. But in other cases, the veins having been compressed while the arterial supply went on, successive hæmorrhages have taken place. I have twice known sudden death so caused. I once went with the late Mr. Fowler, of Kennington, to operate upon a lady at Brixton, when we found that she had died unexpectedly two hours before our arrival. The post-mortem examination showed that death was due to a very large extravasation of blood, first into the ovarian cyst and then, after its bursting, into the abdominal cavity, evidently the consequence of a complete twist of the pedicle by the rotation of a non-adherent cyst. In another case I went to the Hospital for Incurables at Putney to see a patient there by the desire of Mr. Cream. She had been found dead that morning by the side of her bed. I opened her abdomen and removed a large free ovarian cyst, which contained more than five pounds of blood-clot, the bleeding in this instance also caused by a long twisted pedicle. These are the only two cases of sudden death I have seen, but I have many times known hæmorrhage to a smaller extent lead to attacks of pain, vomiting, and supposed peritonitis; and more than once such extreme pallor or chloro-anæmic aspect as gave rise to ungrounded fear of malignant disease. One very remarkable case of this kind was a lady from Moscow, who arrived in London, May 1879, after a journey which was interrupted at Berlin by an attack of severe abdominal pain and vomiting. She was twenty-four years of age, married in January 1873, had her first child in November of that year, aborted in 1875, 1876, and 1877, and gave birth to a second child in October 1878. In 1876, before the second abortion, she observed a tumour the size of the fist on the left side of the abdomen. After the abortion it increased to the size of a child's head, and so remained during the subsequent pregnancies. The last labour was natural, but the abdomen continued to enlarge until she left Moscow for England to consult me. She was detained a week in Berlin by the symptoms above noticed, attributable, I believe, to a twist of the pedicle, and on reaching London she was suffering from a recurrence of pain and vomiting. She was extremely weak, and so very white and bloodless that, fearing no time was to be lost, I operated after she had been three days in London; and found, as I expected, a quantity of blood-clot within a very rotten cyst, and a narrow cord-like

pedicle so tightly twisted as to be almost broken off. There was no fetor. Extensive recent adhesions to omentum and coils of intestine had mainly kept up the supply of blood to the tumour of the left ovary. The right ovary, being enlarged and cystic, was also removed. The patient recovered without any fever, soon regained her colour, and sent me a coloured photograph portrait to show the difference between her striking pallor before the operation and her look of blooming health afterwards.

The generality of sessile tumours, extra-ovarian and retro-peritoneal, have no true pedicle, but acquire their supply of blood by numerous vessels entering at all the attached parts. Some of the retro-peritoneal, however, in enlarging from their base, drive the peritoneum before them. This then makes a band or cord of connection, and may or may not contain a few large vessels, but does not assume the form of a stem as in ovarian cysts. The proportion of cases in which there is a true pedicle—long or short—and those where the connection of the base of the cyst to the surrounding parts is so intimate that separation can only be effected by a sort of enucleation is not very easy to estimate exactly; because when the base is small and may be surrounded by a ligature, many would call this a short pedicle. But, speaking roughly, I should say that in my practice I have not met with more than 5 per cent. where true enucleation has been necessary.

CHAPTER II

DIFFERENTIAL DIAGNOSIS OF OVARIAN TUMOURS

When a woman with enlarged abdomen comes under medical examination the three inevitable questions rise up for determination: 1st. Has she an ovarian tumour, or is it something else which can give rise to the same symptoms and appearances? 2nd. If she has an ovarian tumour, of what kind is it, and how can we distinguish one kind from another? and 3rd. Are there any other abdominal conditions and diseases of enlargement coexisting with it and disguising its identity, modifying its progress, or influencing our views as to its treatment?

The first point, therefore, which has to be considered in studying a case of abdominal swelling is the organ from which it arises. The presumption being on the side of an ovarian tumour from the existence of a certain set of signs and symptoms, the probability of its being simulated by some other disease has to be discussed. And there are many conditions—some morbid, others natural—which may give rise to doubt and difficulty in coming to a decision; though these diagnostic puzzles vary much in force according to their nature and the conditions under which they offer themselves.

After the following enumeration of the principal states and diseases which may throw doubt on the diagnosis of an ovarian tumour, or for which it may be mistaken, I shall proceed to the separate consideration of the most important. In connection with the peritoneum we have:

Ascites,
Encysted dropsy of the peritoneum,
Tympanites and phantom tumours,
Fibro-plastic tumours of peritoneum,
Fatty and other tumours of omentum and mesentery,
Hydatids,
Cancer and tubercle.

Difficulties in diagnosis caused by uterine enlargements arise from:

Pregnancy,
Retained menses and moles,
Air and fluids in uterus or Fallopian tubes,
Fibroid tumours,
Cancer.

Another miscellaneous group is this:

Hypertrophy of the abdominal wall,
Enlargements of other viscera, such as the liver, spleen, kidney, and lumbar and mesenteric glands,
Hydatid cysts of the liver, gall-stones,

Movable kidney, and cysts and tumours of the kidney,
Fæcal accumulations,
Distended bladder,
Hæmatocele,
Pelvic abscess,
Extra-uterine pregnancy,
Enchondroma, or encephaloid disease of ilium or vertebræ.

Many of the evils and discomforts which accompany the progress of a case of ovarian tumour arise, no doubt, from its mere mechanical interference with the organs in the chest, pelvis, and abdomen, displacing and compressing them, impairing their nutrition, and disturbing their functions. But the pressure of the gravid

uterus is as great, or even greater, and a pregnant woman has sometimes to endure real miseries. Still the process is natural, and there are compensations in the shape of local adjustments, and temporary accommodating changes of form and moral influences, which are wanting to the victim of ovarian disease. Instead of being cheered by the hopes and aspirations of maternity, she has to bear the torture of suspense or despair; her blood is impoverished and her nervous system shattered by imperfect assimilation. After a time, the emaciation always going on, and the weary, ceaseless self-watchings, made inevitable by the incapacity to use healthful exercise or to undertake the usual occupations with success, chisel out the features into the peculiar pinched expression which has been described as the *facies uterina*, but which would probably be better named *facies ovariana*.

This drawing, an exact copy of a photographic portrait, gives a very correct idea of the peculiar physiognomy. The emaciation, the prominent or almost uncovered muscles and bones, the expression of anxiety and suffering, the furrowed forehead, the sunken eyes, the open sharply defined nostrils, the long compressed lips, the depressed angles of the mouth, and the deep wrinkles curving round these angles, form together a face which is strikingly characteristic.

The tumour begins to grow on one side, where it occupies space wanted for the large intestine with its accumulations, and no provision is made, as for the uterus, for its expansion or for the due maintenance of its relative position in respect to the viscera. All is irregular and wrong. At first the weight makes it settle down into the pelvis, where it causes irritation of the bladder and rectum. Mounting higher with augmenting bulk, it presses on the large intestine, according to side, and fæcal matter is impacted. The uterus is displaced, thrust down, or to one or the other side, retroverted or anteverted; and,

as the case advances, is sometimes so dragged up by its attachments to the tumour as to be out of reach of the finger in the vagina. Its form is distorted and its functions rendered difficult and painful, though not absolutely impossible; for, as it has been already seen, there are many coincident cases of pregnancy and ovarian disease. The urinary organs seldom escape at any stage of the disease. When the pressure is on the bladder, micturition is either troublesome, impossible, or distressingly urgent. With strain upon or pinching of the ureters, there may be stoppage of the flow of urine, or suspension of its secretion, or poisonous reflux into the system. Even the kidneys may be flattened and almost annihilated. The vital organs in the chest suffer in many ways, and the chest symptoms of oppressed action are often among the most tormenting. Œdema, ascites, and pleural effusion, especially on the right side, occasion the greatest aggravation of misery; and the effects of distension upon the ribs and spine are so opposed to readjustment as to amount to serious hindrance to recovery after tapping. More than once the ribs, which have been thrown out like a fan, with the intercostal structures overstretched, have never returned to their normal condition. The lungs, which have been confined to a very small space, had so far lost their resiliency that air could not easily expand them again. The pleural cavities, filled with fluid, have not been freed by absorption, or the lung has not expanded after tapping, and the patient has died from want of breathing power. Occasionally the same

difficulty has been met with after ovariotomy; and a patient, in whom repair has gone on well so far as the abdomen was concerned, has had her recovery greatly retarded, or has died, simply in consequence of the state of her chest. The two accompanying copies of photographic portraits show well how limited the breathing space sometimes becomes in consequence of the excessive growth of a tumour.

DIAGNOSIS BETWEEN OVARIAN DROPSY AND ASCITES

Our senses of sight, touch, and hearing are all required to assist us in distinguishing ascites from ovarian dropsy, the physical diagnosis being established—I. By inspection and measurement; II. By palpation; III. By percussion and auscultation; and IV. By chemical and microscopical examination of the fluids.

I. *Inspection.*—The *size* of the abdomen is seen to be increased both in ascites and in ovarian dropsy; and, when an ovarian cyst is large, the abdominal enlargement is general, as it is in ascites. But while the cyst is of moderate size, the abdominal enlargement is often partial, more to one side than the other, more below the umbilicus than above.

In *form*, the flanks and sides of the abdomen protrude in ascites, the front not being more convex than in the natural state, or it may be flattened: while in ovarian disease the bulging is generally most evident in front, less so at the sides, and often more on one side than the other. These remarks apply to simple cysts only. Alterations in position generally produce

a greater and more immediate change in the form of the abdomen in ascites than in ovarian disease, the free fluid gravitating much more readily than a cyst can move. The normal depression of the *umbilicus* is altered whenever the general abdominal enlargement is considerable both in ascites and ovarian dropsy; but in the latter disease, although the navel may be flattened as in pregnancy, it is only prominent and bulging (as it very often is in ascites) when ascitic fluid surrounds an ovarian tumour, or when there is an umbilical hernia also. The *superficial veins* may be dilated from the lower part of the abdomen to the chest, on one or both sides, in either disease. This varicose state of the veins only assists in diagnosis when much more evident on one side than the other. Such undue importance has been given to this vascular condition as a distinction between ascites and ovarian dropsy, and between simple and malignant tumours within the abdomen, that the following facts should be recollected:

The appearance of congestion of the episgastric veins, seen merely as a fine network of capillaries, is usually a simple result of absorption of the cutaneous fat, the vessels becoming visible through the thinned and distended skin, and has no diagnostic value. When some of the larger veins, dilated or varicose, in their course from the inguinal region upwards, either cease abruptly in the middle of the abdomen, or run to the hypochondriac region, or even up to the clavicles, anastomosing with branches of the mammary and intercostal veins, the impediment to

the circulation may be of several kinds. It may be either in the heart, the trunk or larger branches of the inferior cava, or in the Portal system. Pregnancy, tumours, or coagula causing obstruction in any of these vessels will throw the circulation into the epigastrics.

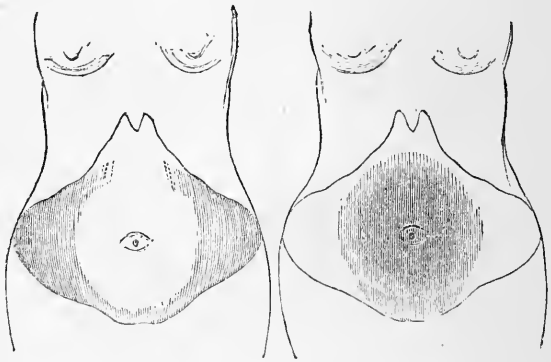
When the integuments are œdematous, the lineæ albicantes become prominent, and have a knotty appearance, which has led to the mistaken appellation of *varicose lymphatics*. I have observed it chiefly in cases of tumour surrounded by ascitic fluid.

The *movement* on respiration is defective in both diseases, both as regards the soft wall of the abdomen and the lower ribs, while that of the upper ribs is exaggerated. The alteration in movement only assists in diagnosis when it is partial or affects only one side. On making deep inspirations the upper part of an ovarian cyst may often be seen to rise and fall. This appearance is very characteristic. In ascites it may be simulated by some distended coils of intestine moving with the diaphragm; but the resonance of the intestine on percussion instantly settles all doubt on this point.

On *measurement*, the enlargement of the abdomen in ascites is equal on both sides, or symmetrical; and, although the distance from the sternum to the pubes is increased, the umbilicus retains its normal position—about an inch nearer to the pubes than to the sternum—and is about on a level with the highest point of the crest of the ilium on each side, and midway between these two points. In ovarian dropsy there is often a considerable

alteration in the measurements between the umbilicus and sternum, and umbilicus and pubes, as well as between the umbilicus and the two cristæ ilii. In ascites the greatest circular measurement is at the level of the umbilicus; in ovarian dropsy it is often some inches lower down.

II. On *palpation*, the abdominal wall, in both diseases, is felt to be harder and more resistant than natural, in the parts made tense by much fluid, but is soft and elastic elsewhere. Consequently the variation in the seat of hardness with the position of the patient becomes useful in diagnosis, the fluid in ascites gravitating freely to the most dependent part. *Fluctuation* is perceived with varying distinctness according to the degree of tension of the abdominal wall, to the thickness of the layer of fat, to the amount of œdema, to the thickness of the peritoneum or of the cyst, to the quantity and character of the fluid, and to the amount of tympanitic distension of the intestines. It occasionally happens that the abdomen is too forcibly distended to respond to the stroke, and gives no sign of fluctuation. In itself, fluctuation offers no assistance in diagnosis, because a thin-walled ovarian cyst, filled with limpid fluid, with a moderately tense and thin abdominal wall, would give a more quick and decided wave than a moderate quantity of ascitic fluid beneath an abdominal wall thickened by fat or subcutaneous œdema. The characteristic peculiarity of the fluctuation in ascites is that it varies with the position of the patient, and is only perceived in the parts where the fluid gravitates towards the abdominal wall; while in ovarian dropsy its situation does not vary with position, but is perceived



wherever fluid is to be discovered by percussion.

III. *Percussion and auscultation.*—The two preceding diagrams represent the situation of clear and dull sounds obtained by percussion in typical cases of ascites and ovarian disease, the patient lying flat and evenly on her back. The dark parts of the abdomen are dull, the rest clear. In ascites, the stomach and intestines are above and in front; the fluid, behind and on either side. In ovarian dropsy the fluid is in front, extending in different degrees to either side, and pushing the stomach and intestines upwards and backwards, just as a gravid uterus does. The figure to the right of the page, indeed, would represent either a gravid uterus near the full period of pregnancy, or an ovarian cyst of about the size of such a uterus, and situated centrally, as many ovarian cysts are at this, or a rather later, period of their growth. But quite as frequently they tend towards one side or the other, in such cases the diagnosis being, of course, easier.

It is seldom that a patient with ascites lies so flat as not to raise the shoulders enough to throw a layer of fluid downwards towards the pubes. Very often the dulness may extend as high as the umbilicus, and it generally does so when the shoulders are much raised by pillows. This might lead a superficial observer to suppose that the disease was ovarian, because there was a dull sound in the front of the abdomen; but on lowering the shoulders and placing a pillow under the hips, the fluid at once gravitates towards the diaphragm, the intestines float to the surface, and a clear sound is obtained where it was dull before. No such alteration in the situation of dulness

can possibly occur in ovarian disease. So on turning from side to side, the ascitic fluid flows over to the side which is low, and the intestines rise to the upper side, with corresponding changes in the situation of dull and clear sounds on percussion. This does not take place in ovarian disease. Again, in ascites, at any spot near the level where the resonance of the intestines ends, and the dulness of the fluid begins, and a dull sound is elicited by *gentle* pressure and percussion, a *deeper* pressure will displace the fluid, and the resonance of the intestines will be heard. At the most depending spots the amount of pressure necessary to obtain a clear sound is some guide to the estimation of the thickness of the layer of fluid. Superficial and deep percussion cannot produce such difference in the sounds in ovarian disease.

When fluid is free in the peritoneal cavity the wave of fluctuation may be felt not only where the sound is dull on percussion, but also beyond the line of dulness, even where resonance may be tympanitic. The intestines float in the fluid, and the fluid may be thrown in waves among them. But when fluid is contained within a cyst, fluctuation cannot be detected beyond the boundaries of the cyst. Hence the outline of the cyst, traceable by dulness on percussion, and the line where fluctuation can be perceived must be the same. The wave of fluctuation ends at the limit of resonance.

It has been supposed that percussion on the loins is a very sure guide in diagnosis—that when the patient is sitting up, and one loin is clear and the other dull, the disease is ovarian, but that when there is dulness on both sides it is ascites. One dull side is also supposed to be a proof that the ovary of that side is the one diseased. But there are so many exceptions to these rules, that they are of no great value, except as corroborating or counterbalancing other physical signs.

Auscultation alone affords little information, but it shows the presence of the gurgling sounds of the intestines in the spots clear on percussion, and the absence of these sounds in the dull spots, except on deep pressure. In both diseases the fluctuation wave may be heard as well as felt. The aortic sounds and impulses are transmitted by the cystic and solid tumours, but not by ascites.

By applying these general rules, a few seconds will enable the surgeon to clear up all doubt in any ordinary case. But there are various conditions which may lead to the necessity for further examination. The quantity of fluid in the peritoneal cavity may be so large that the front of the abdomen is pushed far beyond the reach of the intestines. They float as far as the mesentery will allow them, but cannot reach the surface of the abdominal wall. In this case percussion must give a dull note in front just as it does in ovarian dropsy. So, too, when the intestines are fixed in the back part of the abdomen by adhesions, or by a thickened omentum, the fluid is kept to the front as in ovarian dropsy.

Or an ovarian cyst may contain air or gas, entering either from a perforating communication with intestine, or through the Fallopian tube, or forming after tapping and decomposition of fluid. Percussion then gives a clear note in front or above, and a dull note behind or below, as it does in ascites; and occasionally, where there is a mixture of air with fluid, the sound so well known as metallic tinkling may be heard—air bubbling through fluid—or drops of fluid falling in the cavity. In these circumstances physical diagnosis alone cannot solve the doubt, and we have to consider all that can be learned from the history of the case and the general condition of the patient. So, when fluid is free in the peritoneal cavity, we must resort to tapping and chemical or microscopical investigation before we can decide whether the fluid is the ordinary non-inflammatory serum which transudes into the cavity in heart, liver, or kidney disease, or the inflammatory exudation of chronic peritonitis in its simple or its tubercular or cancerous form, or whether it may be ovarian fluid which has escaped from a perforated or ruptured cyst.

IV. *Chemical and microscopical examination of the fluids.*—The normal Graafian follicle of the healthy ovary contains a minute quantity of a slightly albuminous fluid resembling the serum of blood. It is alkaline, of pale yellow colour, and transparent. It is not ropy but limpid, readily separating into minute drops. It contains a small quantity of a substance which will coagulate when treated with acids or alcohol, or when exposed to a raised temperature. It holds

in suspension spheroidal, nucleated epithelial cells and shreds of epithelium from the membrana granulosa of the ovisac.

After the rupture of the ovisac it would appear that the fluid contents, or 'ovarine,' escape into the peritoneal cavity; but the quantity is so minute that it can hardly do more than moisten the fringes of the Fallopian tube.

There are endless differences in the contents of ovarian cysts, and these differences seem to be in no way dependent on the form of the cysts or the anatomical arrangement of their tissues. Even the many strange epithelial developments are not accompanied by any special kind of fluid. In the simple unilocular cysts, it is most common to find a perfectly clear, colourless, or straw-coloured fluid. But it is not always so; for all gradations of colour and thickness occur, and epithelial cells are almost always floating in the fluids. In some rare cases there are cholesterine crystals which, after standing, form a glittering pellicle on the surface. But although the quantity is really very small, it is so very rarely met with in ascitic fluid, that its appearance may almost be looked upon as diagnostic of the others. True albumen may be present, but in uncertain proportions. It is in the few cases where it is absolutely wanting that simple tapping proves curative. Spontaneously coagulable fibrine is hardly ever a constituent of the simple cystic fluids; a character which distinguishes them from ascitic effusions, from which there is almost invariably a deposit of fibrine taking the form of elastic filaments after washing; the deposit from ovarian serum, if any, being soft and not at all elastic. Ascitic fluids never contain more solid matter than the serum of the blood, and the greater number of ovarian fluids have even less; but any serous fluid, taken from the abdomen of a woman, which, when filtered, leaves after evaporation a dry residue in excess of that which would be found in blood serum, may be pronounced upon as positively ovarian. Pus and blood are seen in different conditions; in some cysts they are mixed with the clearer fluid, and allowance must be made for them in chemical investigations. Among the many cysts of a compound tumour, some may be seen with almost pure serum, and, after tapping, others may contain pus and offensive gases. Blood often mixes with the other contents, and influences the colour as well as other qualities. The yellow, green, brownish, or red tints depend upon the presence of bile acids, or the admixture of blood and pus, which may be recent and pure, or old and undergoing changes. The turbidity of the fluid depends on the admixture of these secondary matters. Blood is not unfrequently effused into the smaller cysts, where it sometimes becomes fibrillated and partially organised, though it more frequently runs into a state of decomposition.

After Scherer's discovery of paralbumen, and the subsequent discovery that this derivative, or altered form of albumen proper, is a chief ingredient in ovarian fluids, it was at first believed that it would be a sure means of distinguishing these from all other fluids in abdominal swellings. But later experience has proved that this test alone is unreliable. The presence of paralbumen is certainly not a positive sign that fluid has come from an ovarian cyst. Dr. Schetelig found the contents of a large renal cyst, which he had emptied, to consist mainly of paralbumen with cholesterine, and there was no trace of urea, the proper kidney structure having been annihilated. But Scherer also pointed out the relations of metalbumen to mucin, which, he says, colloid matter always contains in considerable quantity; and he raised the question whether metalbumen ought not to be considered as a transition state between albumen and mucin or colloid matter. Paralbumen and metalbumen differ from the true albumen in that they are soluble in boiling acetic acid. You take a test tube and boil the ovarian fluid; the albumen is coagulated. You add double the volume of strong acetic acid to the coagulum, boil, and shake it; when, if the albumen be true, the coagulum does not redissolve in the acetic acid. But coagulated paralbumen or metalbumen either dissolves or forms a whitish transparent fluid, or breaks up into a kind of jelly-like translucent mass which is easily distinguishable from true albumen coagulated by heat. These results led to the belief that we had a means of diagnosing abdominal fluids; and it was said that if the coagulated albumen from them dissolved in acetic acid they were ovarian; and if it did not redissolve, they were

ascitic. That was frequently right. Sometimes, however, part would redissolve and part would not. Then the supposition was that it was a mixed fluid, some ovarian and some peritoneal; that an ovarian cyst had burst and some of the fluid was in the peritoneal cavity, making a combined fluid which contained some true albumen and some paralbumen; and this inference was often true.

There are sometimes traces of sugar; and fibrinogen, when a constituent, may be demonstrated by applying A. Schmidt's test—the addition of a few drops of blood to the fluid. A distinct clot will form with fibrinogen in from 25 to 90 minutes, involving the blood corpuscles which had been added. The clot is generally so firm that it can be raised unbroken, and if squeezed in the hand, a quantity of fluid issues out, leaving a loose bundle of fibrillated substance. Klob divided the contents of an ovarian cyst into two portions. Into the one he poured a few drops of blood, and at the end of three hours the whole was converted into a mass as solid as jelly, while the other portion without blood showed no signs of coagulation, even after long standing. Fibrinogen, however, is also found, according to Schmidt and Virchow, in ascitic fluid and other serous secretions. The presence of fibrine was at one time regarded as a proof of an abdominal fluid having been effused from a serous membrane, not from the secreting membrane of an ovarian cyst. And if fluid contained both fibrine and paralbumen, the supposition was that an ovarian cyst had burst and there was a mixture of two fluids. If no fibrine could be detected in the composite fluid taken from the peritoneal cavity, then it was supposed that, instead of preserving their own chemical characters after admixture, the fibrinogenous elements of the serous fluid were acted upon by the paralbumen of the ovarian fluid in such a way as to interfere with the characteristic coagulation.

Dr. Schetelig informed me that, in a case he watched at Breslau, the presence of fibrine in the fluid at the first tapping showed that it was purely ascitic—while, on the tapping being repeated, coagulation did not take place, and paralbumen was detected. This was accounted for by rupture of an ovarian cyst into the peritoneal cavity, a supposition which was subsequently proved to be correct at the time of ovariotomy.

Nor does the presence of fibrine prove that the fluid is not ovarian, for in a dermoid tumour, which I removed in June 1869, Dr. Schetelig made out three distinct kinds of fluids in a number of isolated cysts. In some there was an emulsion of fat and cholesterine; in others the albuminoid liquid so common in ovarian dropsy; and thirdly, in different parts of the large tumour, 'certain small isolated bags full of a limpid thin serum, which, being exposed to the atmosphere, soon coagulated like any other serous fluid overcharged with fibrine.'

The more consistent colloid substances are occasionally distributed in ovarian cysts in a very peculiar manner. They form conical columns with their broad bases directed outwards. Between these columns, a whitish or yellowish matter, consisting of epithelial cells in a state of degeneration, is placed without any definite arrangement. Such cysts have probably been formed by the confluence of several smaller cysts of which nothing remains but the epithelial investment undergoing fatty decay, and so tracing out the former lines of separation.

The chemical examination of colloid substances and other fluids from multilocular cysts has given results of the most contradictory kind, as is seen by Dr. Méhu's assertion, that he has never found a trace of mucin in ropy ovarian fluids. But this may be explained by the supposition that operators have not all had the same opportunity of collecting a great variety of specimens, and have not dealt with the fluids in the same stages of transformation.

While it is certain, therefore, that in cases of doubtful diagnosis complete reliance cannot be placed on the chemical characters of fluids removed from the abdomen, and that the rule of paralbumen being the characteristic of ovarian fluids, and fibrine of serous fluids, and the conjoint presence of paralbumen and fibrine pointing to a mixture of the two fluids, is open to many exceptions—it is still true that the rule is sufficiently often correct to become an aid of much value in arriving at a diagnosis, and to encourage us to attain more accurate knowledge by more extensive observation and research.

In his 'Étude sur les Liquides extraits des Kystes Ovariques,' Dr. Méhu states that all his investigations, microscopic and chemical, were made upon fluids

drawn from the living patient—never from cysts after ovariotomy or from the dead body :

That, while he found the proportion of organic matter to vary from 2·50 grammes to more than 140 grammes in the kilogramme of filtered, and 200 grammes or more in the unfiltered ovarian fluids, the weight of mineral salts obtained from the same quantity was nearly uniform, from 7 to 9 grammes, generally between 8 grammes and 8·50 grammes :

That he could almost always trace the appearance of liquid oil to its use on the trocar :

That the fatty matters found on the surface of the turbid fluids, after being heated for a certain time and then cooling at rest, are the products of the disintegration of the granular aggregations, and cells containing translucent granules, often floating in the recent fluids :

That the aggregations of granular matter are simply adherent without envelopes :

That he considers the large transparent cells with granular contents to be leucocytes enlarged, and not characteristic of ovarian fluids; as he had seen them as often in the fluids of ascites, hydrocele, old serous cysts and hæmatoceles, especially when the effusion was of long date :

That he discovered cholesterine only nine times in 115 ovarian fluids taken from 61 patients, never in larger quantity than 30 centigrammes in the kilogramme; that even the small amount of 10 centigrammes, which was the most frequent, gave the glittering appearance in sunlight; and that it was very rarely seen in ascitic fluid—only twice in 300 cases, one of which had an ovarian tumour, and the other partial peritonitis with Bright's disease :

That the absence of spontaneously coagulable fibrine is the only characteristic which he has found distinguishing ovarian fluids from those of ascites, since in pure ascitic fluids after twenty-four hours' rest, there is almost always a deposit of some centigrammes per kilogramme of fibrine taking the form of elastic filaments after washing, especially when the effusion has been caused by the irritation of a tumour; while ovarian fluids never give a deposit of this kind spontaneously, and acetic acid only causes the separation of a small quantity of soft matter not in any way elastic :

But that, in connection with this observation, it must be remembered that, when containing a large quantity of leucocytes, ascitic fluid does not yield a deposit of fibrine, and that it is necessary to make allowance for the admixture of blood in the ovarian fluids :

That, as ascitic fluids never contain more solid matter than the serum of the blood, any filtered serous fluid from the abdominal cavity of which the dry residue weighs more than 70 grammes per kilogramme may be pronounced ovarian, and that with a proportion of 80 grammes or more there can be no longer any doubt :

That this point of diagnosis only applies to the minority of cases, as the greater number of ovarian fluids leave a deposit of less than 70 grammes :

That the only cases of cure after tapping are those in which the fluid comes from a simple cyst, is clear, free from albumen, and yields a residue of not more than 18 grammes to the kilogramme :

That the composition of the fluids varies very much in twin tumours, in the different parts of a multilocular tumour, and at the earlier or later stages of the same tapping :

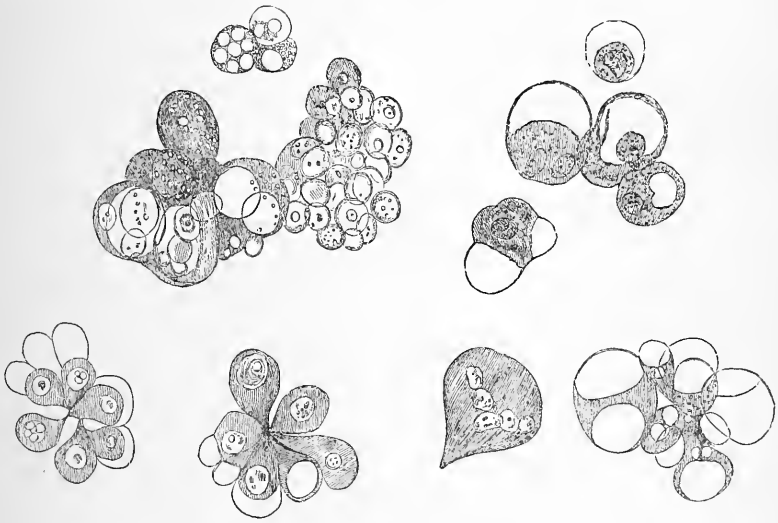
That the viscidity of the ropy ovarian fluids is due to paralbumen, which has never yet been produced separately in a pure state; and that he has never found a trace of mucin in them.

It is to be regretted that the service afforded to our diagnosis of abdominal fluids by assisted sight is uncertain. Microscopical science in its application to medicine requires the skill, aptitude, and discrimination of an expert. Observations made without wide experience, the most scrupulous precautions, and an absolute freedom from speculative bias, are misleading. In ordinary practice the necessary qualifications and conditions are rarely at command. Such work as has been done hitherto leaves us without positive guidance in forming our judgment, and we must be satisfied with a confirmation of opinions by the ocular interpretations of objects under magnifying power.

Long ago Hughes Bennett took the investigation of ovarian fluids in hand, and he was followed by Nunn. Both observed the same granular cells and granular matter in many of their examinations, and Drysdale has done so too. Bennett and Drysdale regarded them as

diagnostic, but Nunn accepts them as of only secondary importance as a point of evidence. Peaslee remarked upon their frequent absence from fluids taken from cysts removed from the ovary, and thought the utmost that can be said is that, when seen, they give a presumption of ovarian fluid. The later work of Foulis and Thornton does not add any greater certainty to this question. But they have gone a step further, and pointed out that in cases of ovarian or peritoneal cancer or sarcoma there are to be found in the abstracted fluid evidences in the shape of what they call 'characteristic groups of cells.' These they describe as large pear-shaped, round, or oval cells containing a granular material, with one or several large clear nuclei with nucleoli, and a number of transparent globules or vacuoles. The cells composing the groups are many of them very large, but the great variety in size and shape is the marked feature of the group.

The discovery of these objects ought no doubt to put us on our guard when we have to deal with tumours doubtfully malignant. If seen, one may be pretty certain that the tumour is in some way malignant; or, if they be found in fluid removed from the peritoneal cavity, probably a sort of infecting process has been going on there, from the rupture of an ovarian cyst of a malignant character. These cells may have planted themselves and multiplied, or they may have given a



taint to the cells of the part and influenced them to a malignant form of reproduction. The truth, however, really is that malignant disease is a condition of degradation. Nutrition is imperfect and development is misdirected. It has no specific form of cell, but such cells as are produced in its growth are deformed, distorted, and early necrosed; and the microscopic objects we find in general in the suspicious ovarian fluids are nothing more than groups of cells, some proliferating with rachitic profusion and monstrous, others either dying or dead; all being evidence of abnormally rapid growth, retrograde change, and the early death of successive generations of degenerate cells, the essential characteristics of malignant disease.

CHRONIC INFLAMMATION AND TUBERCLE OF THE PERITONEUM

The fluid poured out as the result of inflammation of the peritoneum, instead of lying free in the cavity, is sometimes confined in pouches formed by adhesions among the viscera, or by false membrane, or by attachments of the omentum or mesentery.

In his classical work 'On Diseases of Women,' West says: 'One instance of this latter occurrence has come under my own observation, in which between four and five quarts of a dark fluid were found collected between the folds of the omentum, and during the patient's lifetime frequent discharges of a similar fluid had taken place from the umbilicus. The

dropsy had during the life of the patient been supposed to be ovarian; but, though malignant disease of both ovaries was discovered, yet neither of them contained fluid at all similar in character to that which was found in the omentum; nor, indeed, could either be detected till after the fluid in the omental cyst had been let out. I am aware of no means by which such cases are to be discriminated from ovarian dropsy; as far as I know, their nature has scarcely ever been suspected during the lifetime of the patient.'

The fluctuation in such cases, even if distinct, is always limited in extent, and confined to the same spots. The intestines are found behind or beside the tumour, and do not as in ascites rise up to the front of the abdomen, or vary with the position of the patient. The appearance of the belly is flatter than in cases of tense ovarian cysts, the respiration is less impeded, and œdema of the extremities is seldom seen. Sometimes, too, the small intestine and omentum may be matted together, and the way in which one may be misled under such circumstances is seen by the following notes from my case-book.

February 1870.—A lady, aged 44, married for 14 years, was cachectic, pale, and emaciated, with fluctuation of the abdomen in all directions; the os uteri open, and the cervix large. By the vagina, what was supposed to be a cyst could be felt behind and above the uterus. Within the last 2 years there had been some increase of size, but not rapid until the last 9 months. Diagnosis: ovarian cyst, chiefly one large cyst. Tapping was advised, and 17 pints of fluid were removed, a good deal also being left behind. On March 17 she was filling again, and fluid could be felt in the peritoneal cavity. The uterus was free, but the cyst could not now be found behind it. The operation for removal of the tumour was done on March 31. The whole of the fluid was found to be in the peritoneal cavity. The uterus was roughened on its peritoneal surface, and both ovaries felt large, that on the left side as big as a walnut. Above and to the left was a mass feeling very like a multilocular ovarian cyst, evidently formed by adhering coils of intestine, thickened peritoneum, and omentum. There were no bad symptoms after the operation. In this case the uterine examination and the moving mass above the umbilicus deceived me; the mass of intestine and omentum felt so very much like an ovarian cyst. In subsequent cases percussion has removed doubt.

Two very similar cases are recorded in the American journals; one in which McDowell, after considering the diagnosis as certain, opened the abdomen and found nothing but a mass of intestines conglomerated by adhesions; in the other the ovaries were discovered to be sound, and the swelling due to thickened and indurated omentum.

But fluid in the peritoneum may be associated with cancer and tubercle of the membrane, and give rise to difficulties in the diagnosis, as in the case of an unmarried lady, aged 22, whom I saw in 1862. The abdomen was as large as that of a woman near the full period of pregnancy, and was distended uniformly by fluid, which gravitated so decidedly to the lowest point with all changes of position, that it was evidently free in the peritoneal cavity; and looking to the appearance of the patient, and to the fact that she had occasional pain, I had little doubt as to the disease being a sub-acute form of tubercular peritonitis. With a tonic treatment and diuretics there was temporary improvement. But some months afterwards all the symptoms were aggravated, and a remarkable change was found to have taken place. The abdomen was much more prominent or arched than before; it was dull anteriorly in all positions of the body, and clear in both flanks as she lay on her back. Moreover, on taking a deep inspiration, a cyst appeared to move downwards from the epigastrium beneath the parietes. Fluctuation was evident in all directions. This led me to doubt the accuracy of my first opinion, and she was tapped. The diagnosis still remaining uncertain, I made an exploratory incision. No cyst appeared. A large quantity of opalescent fluid escaped, and then the whole of the peritoneum was seen to be studded with myriads of tubercles. Some coils of small intestine were floating, but the great mass was bound down with the colon and omentum, all nodulated by tubercle, towards the back and upper part of the abdomen. The uterus and ovaries were felt to be of the normal size, but their peritoneal coat was very rough. The patient was treated

precisely as after ovariotomy. She went through rather a sharp attack of peritonitis, but after two or three days suffered hardly more than from tapping. She passed large quantities of urine, and as it seemed as if the use of the catheter excited this diuresis, it was continued long after the wound had healed. But the most remarkable part of the case remains to be told. The patient got well, married, and has been well ever since. Whether the peritonitis set up led to fresh adhesions or not, certain it is that no more fluid was secreted. I heard that she was well in 1884.

CANCER OF THE PERITONEUM

may lead to abdominal tumours of very different size and consistence, and is generally accompanied by more or less fluid in the cavity; or, as in a case mentioned by Ballard, by an effusion of gelatinous matter, with great elevation of the diaphragm as in ascites, dulness on percussion everywhere but at the epigastrium and along the margin of the ribs on the right side, and fluctuation in every part. The symptoms produced by this condition of the peritoneum have been sometimes so closely like those met with in many cases of ovarian cysts as to deceive men of very great experience; and I have repeatedly been sent for under such circumstances expressly to discuss the question of ovariotomy, when the patient was not far from the end of her career. Among my own cases the coexistence of cancer has been sometimes so masked by the symptoms of ovarian disease that one has been led on by the hope of giving operative relief. For instance, in a case on which I operated in October 1868, the peritoneum exposed was so thick that I doubted whether it was the cyst or not, and so tapped rather than make any separation of it. Some pints of red serous fluid escaped, and more still when the trocar was withdrawn. On enlarging the opening some small intestines appeared floating in the remaining fluid. It was then seen that a multilocular cyst had given way behind, and that its sac formed one general cavity with the peritoneum. Below a large secondary cyst was prominent. This I tapped and emptied, and then found the whole of the outer coat of the large cyst so intimately adherent not only to the abdominal wall, but also to the uterus and sides of the pelvis, that I determined not to attempt any separation, especially as some hardish white nodules which were irregularly scattered about the cyst walls were very strongly suggestive of carcinoma, and confirmed the previous suspicion which had arisen as to the rupture of a cyst before the tapping, and the diagnosis of malignant disease. The patient died about sixty hours after the operation.

Examination showed that 'the peritoneum had entirely lost the character of a serous membrane, and was represented by a thick, tough, ash-coloured membrane extending all over the abdominal cavity and its contents. It contained about two pints of reddish fluid without clots. Cancer of the mesocolon transversum, 10–12 inches in length and 1 inch in breadth, extending to the edge of the spleen, which is not involved. Multilocular cyst of the right ovary, the size of a fœtal skull. One cyst showed the trace of tapping during the operation. The cysts do not contain much fluid, but mostly cancerous matter. Uterus small, healthy, except one small point, the size of a pea, on the fundus which looks white and cancerous. Cyst of the left ovary the size of a walnut; no cancer.'

A similar case was that of a widow, aged 51, who in July 1868 had a hard movable nodule under the right false ribs, and a tumour in the abdomen visibly movable, without any evidence of adhesions. The parietes of the abdomen were thin, marked with numerous lineæ albicantes, but there were no dilated veins. A wave of fluctuation was felt over the surface of the tumour, and the sounds on percussion were clear two inches above the umbilicus, dull in the lumbar region. The tumour could be felt in front of the uterus, and through the rectum. It began to form about twelve years before, but caused no inconvenience for six years. It then grew rapidly, filling the abdomen, without much pain. The size had much augmented of late. The patient was twice tapped, about 12 pints of clear and slightly coagulable fluid being drawn off from the peritoneum each time.

On August 3, a tentative incision was made. A white glistening tumour was exposed on dividing the peritoneum. A few pints of clear fluid escaped, and I then felt the movable nodule under the right

false ribs to be apparently a lump of cancer in the abdominal wall. The uterus and ovaries seemed to be fused together, the intestines adhering behind; there were also some slight but vascular parietal adhesions. The patient died about ten days after the operation. There were three or four pints of serum in the peritoneal cavity, and adhesions of the omentum and transverse colon to the upper part of the tumour. A hard white nodule as large as a walnut, in the abdominal wall below the right false rib, was found to consist of fibrillated connective tissue, with large oblong nucleated cells in an advanced stage of fatty degeneration. Both ovaries were fused together, and formed one tumour; a sebaceous and piliferous cyst was formed exclusively by the left ovary, and the rest of the tumour by the right.

In all such cases suspicion of their real nature should be aroused if a patient has either a very thin and tense, or an œdematous abdominal wall, anasarca of the lower limbs, general emaciation, a cachectic aspect, free fluid in the peritoneal cavity, and especially so if the loss of flesh and amount of pain are more rapid and severe than an ovarian or other innocent tumour would account for.

TYMPANITES AND PHANTOM TUMOURS

Tympanitic distension of the abdomen may give rise to some awkward questions; but it is difficult to believe that any surgeon of reasonable experience could be so deluded by such a condition as to think that he had before him a case of ovarian tumour, and attempt the operation of ovariotomy. Yet Simpson says that it has happened no less than six times, and Bright published the case of a woman who entered Guy's Hospital with an unhealed incision in the middle line of the abdomen said to have been made by a surgeon for removal of a tumour. She had distension of the abdomen, with a variety of hysterical symptoms, and was recognised as having been formerly under the care of Dr. Marcet for the same condition. Though the abdomen bore a very peculiar appearance, strongly resembling an encysted tumour, the general symptoms were so marked that a little observation was sufficient to convince any experienced person of the real character of the disease.

Boinet relates also that a miserable woman of weak intellect, tympanitic and impressed with the notion that she had an abdominal tumour, was unfortunate enough to meet with two or three surgeons who persuaded themselves that she had ovarian disease, and gave way to her importunate demands for an operation. Their rash gastrotomy only showed the existence of cancer, and killed the woman.

These hysterical distensions of the abdomen present themselves in a variety of forms. Sometimes the belly is uniformly blown up to the size of advanced pregnancy, and is rounded, hard, and resistant. The hand makes no impression on it, and change of position causes no alteration in shape. But there is no fluctuation—the resonance is universal, hysterical symptoms are generally present; and, under the influence of chloroform, the swelling entirely disappears, leaving the abdomen flaccid, and allowing the hand to rest upon the bones of the spine. In other cases the distensions are local, and it is noticed that they occur more often on the right side. Portions of the abdominal wall are gathered up into rigid knobs, which remain so long unaltered as to simulate an internal tumour, especially as they are sometimes situated over accumulations of hardened fæces, and are accompanied by a good deal of tenderness of the parts. Careful and patient palpation, purgatives, and chloroform will generally lead to a solution of the mystery; or may even disclose the existence of an unsuspected ovarian tumour, which, by its presence in the pelvis, had given rise to the train of hysterical symptoms, and, among others, to the swelling, apparently the most important matter calling for treatment.

The first drawing on the next page, from a photograph, shows how very accurately one of these phantom tumours, or the condition which I have now been describing as hysteric tympanites, may resemble a uterine or ovarian tumour. The lower part of the abdomen arches forward exactly as in pregnancy, or as with an ovarian tumour of moderate size when the abdominal wall is not lax; and the wall is so tense, the patient so resists pressure, or complains so much of tenderness on pressure, and the abdominal muscles contract so spasmodically and irregularly, that it is by no means difficult to fancy that a tumour, or even the movements of a fœtus, may be felt. The girl whose portrait is

here given was in the Samaritan Hospital for some time, and it was difficult to convince her, her friends, and even some

medical friends who saw her with me, that she had no abdominal tumour. The tympanitic resonance on percussion was, of course, the leading element in the diagnosis; but the most conclusive test was the complete subsidence of the swelling and the flattening of the abdomen when the girl was fully under the influence

of chloroform. The photograph from which the second drawing was made was taken while she was completely narcotised. The arched abdomen is seen to have been quite flattened, and it was easy when the abdominal walls were so flaccid, to feel the pulsations of the aorta, the vertebral column, the brim of the pelvis, and to become certain that there was no abdominal nor pelvic cyst of any kind. Yet the instant the effect of the chloroform began to pass away the tumour always began to reappear. This was shown several times when the experiment was tried, and on one occasion a photograph was taken when she was nearly awake, and the tumour was almost as prominent as in her ordinary condition, shown in the first drawing. She was an hysterical girl, but there was no voluntary or conscious imposition on her part so far as I could ascertain. She improved under a course of purgatives and steel, but I have not seen

her since she left the hospital. In one woman the abdominal wall thus expanded gave rise to a suspicion of double ovarian cyst. The recti muscles formed a distinct line of demarcation between two protuberances. The supposed tumour seemed to be well defined, but the belly resumed its natural shape under chloroform.

In 1872 a woman was sent to the Samaritan Hospital, supposed to be suffering from a large ovarian tumour. The tympanitic resonance, with the absence of fluctuation, at once showed that there could be no large abdominal tumour, but some hardness above the pubes led to a vaginal examination, when an early pregnancy was detected. On administering chloroform the distended abdomen at once flattened down, and the outline of the enlarged uterus could be distinctly traced.

This is the only case in which I have seen tympanites occur in a pregnant woman. I have, however, several times seen it accompany small fibroid tumours of the uterus, uterine polypi, uterine displacements, and small ovarian tumours which have not risen out of the pelvis. Once only have I met with this voluminous turgidity in a man, and with him I had no difficulty. He was one of the Crimean invalids, and came into my hands at Smyrna.

FIBRO-PLASTIC AND FATTY TUMOURS OF PERITONEUM, OMENTUM, AND SUB-PERITONEAL CELLULAR TISSUE

The symptoms caused by the growth of large fatty and fibro-plastic tumours from various parts of the peritoneum or mesentery so much resemble those of true ovarian disease, that their real nature can only be determined in some cases by an exploratory incision or tapping. The difficulties and dangers attending these obscure diseases are exemplified in the histories of the cases which now follow.

In 1867 I operated on a lady aged 43, who for many years had been suffering from an abdominal tumour about the nature of which various opinions were entertained. My first incision was exploratory, and showed that the tumour was a mass of fat. It was then arranged that an attempt should be made to remove the tumour. This was done, and lobulated masses of fat, weighing 20 pounds, were extracted after dividing a loose cellular capsule. A large lobule felt in the neighbourhood of the right kidney was not disturbed. The tumour appeared to have originated in the mesentery. Some of the lobules were evidently *appendices epiploicæ* enormously hypertrophied.

The patient died 58 hours after the operation. The mass of fat left on the right side involved the right kidney, pushed the ascending colon over to the left, and adhered to the under surface of the liver. Many mesenteric glands were enlarged and enveloped in fat. There was not more fat than usual in the omentum. The weight of the portion of fatty tumour not removed during life was estimated at 10 or 12 pounds. The uterus and both ovaries were healthy.

Mr. Cooper Forster, in the 'Pathological Transactions,' records another case of fibro-fatty tumour of the abdomen, weighing 55 pounds. In the greater part of the tumour fat-cells with the usual connective filaments and vessels made up the tissue—histologically perfect fat.

A woman, aged 26, after her confinement in 1867, felt a small lump in the right iliac region. This increased very slowly until May 1869. After May the growth was rapid. On February 23, 1870, an exploratory incision was made. On exposing the peritoneum I perceived that the tumour was an extremely vascular, soft, friable, granular mass, and satisfied myself by stopping the bleeding, which was rather free, both from arteries and veins. She died March 3, and on examining the body I found the tumour to be firmly adherent to the abdominal wall, to the liver and intestines, and to the uterus behind; but both uterus and ovaries were free from disease. In some parts there were detached bodies like large appendices epiploicæ, and from some of the intestines there were cyst-like growths. Dr. Wilson Fox reported that the masses, and growths on the intestines, appeared to be of a doubtfully malignant nature, but that he found no secondary implication of other organs.

In the 'Archives of Pathological Anatomy' (Bd. 63, No. 4) Virchow describes a retro-peritoneal tumour, which I had removed from a lady in Pomerania in May 1875, and left with him for examination on my return through Berlin, as a 'fibroma molluscum cysticum abdominale.' The patient was a widow, 40 years of age. She had been tapped, and a large amount of pus without odour came away. Finding on my arrival a very large abdominal tumour only centrally fluctuating, and pressing the perineum and posterior vaginal wall far down between the thighs so that I could not ascertain the state of the uterus, I was in great doubt as to the nature of the case, but at once commenced an exploratory operation. After dividing the abdominal wall to the extent of five inches between the umbilicus and pubes, some loose fat was seen with very large veins. Carrying on the incision it passed into the substance of a solid tumour apparently glandular or fibro-plastic; and on pushing one finger onwards, a cavity was opened from which some 15 to 20 pints of pus escaped with masses of yellowish white curd-like substance. By drawing the back part of this cavity forwards, thus inverting it and pulling

upon it, a large solid mass was withdrawn. It had lain behind and to the right side of the uterus in the loose cellular tissue of the pelvis. Its connection with the left side of the uterus behind was first tied and divided, without interference with the left ovary or tube. A similar connection on the right side was secured by transfixion and ligature. The quantity of fluid removed was 7 litres, the solid matter 10½ pounds, or about 25 pounds in all. I left the lady next day going on well, and with the exception of some bladder trouble, recovery may be said to have been uninterrupted. I heard of her in 1884 as in excellent health.

Virchow speaks of this fibroma-molluscum as a common formation in the cellular tissue of the pelvis; but in my experience tumours of such character attaining a size calling for surgical treatment are extremely rare.

Tumours described as sub-peritoneal, myxoma-lipomatodes, or lipoma-myxomatodes, have been observed in the sub-peritoneal tissues and in the mesentery and cases have been recorded in which, after removal of the abdominal tumour, secondary formations of similar structure have taken place in the neighbouring glands, or in other organs such as the lungs or liver.

HYDATIDS

Hydatids growing from some part of the peritoneal surface often acquire an enormous bulk, and distend the abdominal walls in proportion. The displacement of the viscera, the encroachment on the thoracic region, and the coincident interference with the action of the heart and lungs, are as marked as in advanced cases of ovarian disease. But the history of a case of hydatids will commonly show that the dilatation commenced in the upper part of the abdomen, extended next to the hypochondria, and, lastly, to the pelvic region. The growth of hydatids is more rapid than that of ovarian cysts. There may be similar irregularities of surface and contour felt by pressure, but the interspaces or depressions between the projecting masses will be more distinguishable in hydatid disease; and are sometimes marked by distinct resonance, when portions of distended intestine happen to be lying amid them. The abdominal resonance is more lateral in hydatid disease than in cases of ovarian tumour, but in both cases will be limited to the part in which the bowels are pent up. The fluctuation in hydatids is obscure and circumscribed; but when it can be felt the hydatid fremitus is decisive. It must after all be remembered that hydatids may originate in any part of the peritoneum, and when they happen to do so in the region of the broad ligament the diagnosis will demand additional circumspection.

The best-marked case of hydatids of the peritoneum, as distinguished from hydatid cysts of the liver, which I have seen, was a woman who was in the Samaritan Hospital in 1870–1. The appearance of her abdomen is well shown in the

drawing, copied from a photograph taken after her admission to the hospital.

The abdomen had all the appearance of a case of multilocular ovarian cyst. Fluctuation was very distinct, but the chief peculiarity of the case was the existence of numerous hard nodules scattered over the abdominal wall. Some of the best marked of these are shown on the drawing near the umbilicus. They were quite hard, and suggested the belief that they might be nodules of hard cancer. Some of them being semi-resonant gave rise to the fear that they might be formed on the coat of intestine; but the fact that the disease was of about twelve years' duration, that the patient had borne healthy children during its progress, that she was not much emaciated, did not suffer from

sickness or diarrhœa, nor from much abdominal pain nor tenderness, showed that cancer might be almost certainly excluded from the diagnosis, even before hydatid fremitus was noticed. This was most distinct, and the diagnosis was completed by the puncture, with a fine trocar, of one of the nodules felt in the abdominal wall. A little clear fluid escaped, in which the hooklets of the echinococcus were distinctly seen. No very urgent symptoms being present nothing more was then done. I afterwards operated and removed 3 or 4 pounds of hydatids. Considerable relief was given, but the woman died at the end of a few months.

In another woman, thin, anæmic, and of consumptive parentage, sent to the hospital as a case of ovarian disease, I found the abdomen distended, tender and fluctuating, the uterus small and mobile, pressed forwards above the pubes, and Douglas's space occupied by an elastic tumour. I made an exploratory incision, opened a cavity, and let out some pints of fetid pus. Then several small cysts attached to the omentum and mesentery were removed, and a larger cavity, corresponding with Douglas's space, was discovered and more pus evacuated. After death it was seen that the intestines, omentum, and other viscera were matted together and formed a sac containing thin purulent fluid, while the liver and spleen were filled with hydatids. There was a small cyst in the broad ligament on the right side by which the uterus was drawn up in that direction, and on the left side the ovary was masked and the pelvis blocked up by numerous small cysts filled with hard, gristly, calcareous substance evidently of hydatid origin.

Large hydatid cysts of the liver extending low down in the abdomen, or even into the pelvis, have frequently been mistaken for ovarian cysts. In one such case, a young lady who was sent to me by Sir James Clark, I was able, with the assistance of Sir William Jenner, to make an accurate diagnosis, and removed 64 ounces of clear fluid from an hydatid cyst which projected downwards from the liver. Two years elapsed before any of this fluid recollected. I then tapped again, and found only nine ounces in the cyst, the patient being apparently well some few months afterwards. In two similar cases, in the Samaritan Hospital, emptying hydatid cysts of the liver by tapping, assisted by an exhausting syringe, has been followed by what we may confidently hope is a permanent cure. In another case, after tapping, the cyst suppurated, its contents decomposed, the cyst became distended with gas, and I inserted a drainage tube. Daily injections of iodine solution were used, and the patient completely recovered. Cases have been recorded where the cyst, before draining, was stitched to the abdominal wall, but I have not yet done this.

Such cases are not likely to be mistaken for ovarian cysts by anyone conversant with the signs of hydatid diseases of the liver, so well described by Frerichs and Murchison. The freedom of the pelvis and hypogastric region from the presence of a cyst, and the limitation of the first evidences of disease to the upper part of the abdomen, are the main points of distinction. I have never seen a case of hydatids in the substance of the ovary, and it is curious that these organs seem to be avoided as the seat of parasitic life; for it is probable that in the reported cases it was only by superficial attachment to the peritoneal covering that the hydatids had any relation to the ovary.

PREGNANCY AND DISTENDED UTERUS

Certainly the most common mistakes in diagnosis occur when the uterus is enlarged from some cause; and pregnancy is the most common of all causes of enlargement of the uterus. Circumscribed enlargement beginning and going on without other marked signs of pregnancy leads to the suspicion of cystic growth, and to turn this into conviction we have to consider the age of the patient, certain malformations of the genital organs, the state of the general health, some functional irregularities, the progress of growth, the configuration of the abdomen, the results of percussion and auscultation, and the manual examination of the uterus. Certain limits of age negative the possibility of conception, although instances are recorded where girls between 12 and 15 and women up to 60 have borne children. Still, the limits of 15 and 45 are very rarely passed. So that in patients very young or very old the presumption must be that a voluminous abdomen is the seat of disease. Again, some malformations of the generative organs render pregnancy impossible; but it must not be forgotten

that impregnation has been effected where penetration of the vagina by any solid body was impossible; and in spite of procidentia of the uterus, and of such diseases of the vagina and uterus (vesico-vaginal fistula or uterine cancer, for example) as might appear quite inconsistent with sexual intercourse.

Then the size and position of the swelling and the duration of its growth taken together will influence the diagnosis. A tumour of nine months' certain duration, yet no larger than a uterus at the fourth or fifth month, or one of only four or five months' standing as large as the uterus at the close of pregnancy, will not be attributed only to fœtation. In the case of a tumour the history is frequently that of its discovery on one side, and its advance is more or less regular according to its nature, while examples of the displacement of the early gravid uterus are exceptional.

It will be found in the majority of cases of tumour which have lasted long enough, and become large enough to simulate pregnancy, that instead of the ordinary sympathetic disturbance of the functions, the health of the patient has materially given way, especially if the disease be assuming a malignant form; and that owing to the comparative fixity of its base of attachment, and from the want of that mutual adjustment of parts which mitigates the miseries caused by the distending uterus, more than the natural amount of discomfort and pain is encountered. By itself, the absence or excess of the menstrual flow decides little, and the gastric, mammary, and nervous symptoms of pregnancy may also be set up by sympathy with the ovarian irritation. In a case where the question is between pregnancy and ovarian disease, there is hardly time for the modelling out of the peculiar facies ovariana, and no one general symptom can by itself be taken as conclusive; though in most of these consultations the first observation of a patient gives to an experienced eye a right impression as to the real state of matters.

It is very seldom that a growing ovarian cyst, even when unilocular, will leave the symmetry of the abdomen unaltered. The compound and dermoid forms are almost invariably lobulated, and give rise to unseemly irregularity and distortion of the contour, and a great difference in the radiating measurements from the umbilicus. The pointing or flattening of the umbilicus tells nothing as to mere growth, but whenever the prominence is considerable, the ring open, the skin thin and distended, there is almost always fluid free in the peritoneal cavity, and any tumour is to be otherwise recognised.

The superficial veins of the abdominal wall are seldom so much distended in pregnancy as they often are with large ovarian tumours: but lineæ albicantes are more common in pregnancy. They are seen, however, over all large tumours of rapid growth. When recent they are of a dark purplish colour; when old they are white, glistening, or silvery. When the abdominal wall is œdematous, the lineæ become very prominent. This appearance, common in large solid or semi-solid abdominal tumours, is rare in pregnancy.

It is only when the abdominal wall is very thick, or the fœtus misplaced or dead, that the heart sounds cannot be heard after the sixth month. Sometimes they are masked by the placental murmur, a blowing sound, synchronous with the beat of the maternal heart, rarely absent in pregnancy, but very similar to a sound common in large fibroids of the uterus, but very rarely perceptible in ovarian tumours. The aortic sound and impulse of the mother, being perceptible both in pregnancy and in many uterine and ovarian tumours, are of very little diagnostic value.

Up to the fifth month the pregnant uterus gives no sense of fluctuation; it has rather the consistence of a glandular or fatty tumour. After the fifth month the sensation conveyed to the finger is that of displacement of fluid, allowing a hard body to be felt. This is the fœtus, which from the sixth to the ninth lunar month may be pushed from side to side. After the seventh month it is often possible to trace the general outline of the fœtus so clearly that no mistake can be made. But when the abdominal wall is thick, some of the more solid varieties of ovarian tumour may very closely resemble the shape of a fœtus. An ovarian tumour surrounded by ascitic fluid, or a mass of small cysts projecting into a large one, may be moved very much like a child in the liquor amnii. But the independent movements of the fœtus are very characteristic, and, if felt, conclusive. Sometimes, however, with a living child these movements can-

not be felt; and if the child is dead, of course they cannot be made.

There are no ovarian tumours which give exactly the same sensation as the ballottement of the fœtus in utero, though internal like external ballottement may be simulated by a hard tumour floating in ascitic fluid, or by a large cyst containing internal projections. The movements of a cyst with a long pedicle could hardly be mistaken for those of the uterus, as the corresponding vaginal touch will indicate its independence. The effect which tumours mechanically make upon the position and form of the uterus does not much resemble that of pregnancy, and with the usually open state of the os in ovarian disease, nothing can invalidate the evidence of the sound. And as in a case of disputed pregnancy the symptoms can rarely be so urgent as to require immediate operation, the best policy is to wait.

Happily, cases of malplaced fœtation are comparatively unfrequent. It is not clear which is the most common point of attachment of the errant ovum. During the life of the patient, it is admittedly almost impossible to determine in what part of the genital tract or abdomen the ovum is being developed. Hecker states that these pregnancies are mostly abdominal; Parry, that he finds the greater number recorded as tubal. Wherever they may be, and however much they may physically resemble an incipient ovarian cyst, the early diagnosis will very much depend upon the indications of conception. These are absent in the case of ovarian disease, and there are not the distressing symptoms, such as hypogastric colicky pains, vaginal hæmorrhages, with sometimes discharge of decidua, which accompany these irregular fœtations. Nor do we meet with the curious moral condition in which the woman persistently believes herself *enceinte*. Too often the diagnostic problem finds its solution in the early death of the subject. If the patient should survive the third or fourth month, the probability is that the gestation is abdominal. Seventy-six out of 132 cases noted by Hecker escaped. The attention will then be turned to other matters. The detection of the fœtal form, its movements, ballottement, the sounds of the heart and the placental murmur will at once settle the question. Still later, or at the full term, the signs of a spurious labour, followed by diminution of size, will influence a decision. If, after this, the process of encystment should continue, the tumour resulting may be either fluctuating or solid. With an accumulation of fluid in the amnion, and consequently no diminution of size, one must resort to abdominal ballottement, with the patient on hands and knees; and in that position the remains of the fœtus would generally be felt. But between a solid mass of a date longer than the nine months of pregnancy and an ovarian tumour, judgment will be mainly influenced by the absence of the symptoms of pregnancy during the early stages of development, the absence of false labour at or near the end of the natural term, and the steady regular increase in size after the usual period of gestation has passed. Finally, it is self-evident that no ovarian cyst except a dermoid can come into competition with one of these conceptions which has had the privilege of more than half a century of incubation, and has degenerated into a substantial lardaceous compound, or established a claim to the pompous appellation of lithopædion.

The greatest difficulty in diagnosis arises when the uterus either undoubtedly contains something, or is enlarged as in pregnancy. The so-called moles or hydatids, which are really hydatidiform degeneration of the chorion—intra-uterine polypus—cancer of the body and fundus of the uterus, while the cervix remains unaffected — hæmatometra, hydrometra, and physometra—are all conditions which must be borne in mind, and which may resemble ovarian tumours in some particulars, pregnancy in others.

If the uterus instead of a fœtus should contain a mole, the breasts may swell, the catamenia cease, and all the other signs of pregnancy may be present for a time. Usually molar pregnancy comes to an end about the third or fourth month, but cases are on record where it has been protracted to the thirteenth and fourteenth months; and Churchill alludes to a case where an unmarried woman had a frequent discharge of 'uterine hydatids' throughout her menstrual life. In molar pregnancy the uterus does not enlarge so regularly as in ordinary pregnancy. The enlargement is usually more rapid, and the functional disorders are more intense. I once saw a woman with a

supposed ovarian cyst, fully as large as at the end of a normal pregnancy. While we were examining her in the out-patients' room, uterine contraction came on; and with very little help by fingers in the vagina and pressure on the abdomen, nearly a pailful of these 'hydatids' was expelled.

An intra-uterine polypus has often been mistaken for pregnancy. After the dilatation of the cervical canal, and commencing expulsion from the os, it has even been supposed that abortion or labour was going on. But it is not likely that this condition would be mistaken for ovarian disease.

Cancer of the body and fundus of the uterus, causing enlargement above while the cervix is unaffected, may be taken for an ovarian cyst which is lying above the uterus, or for pregnancy. But the general cachexia, uterine discharge, and absence of fluctuation will be sufficient to distinguish this condition from ovarian disease, and some of the characteristic signs of pregnancy are certain to be absent.

Collections of blood, or retained clot, the so-called fibrinous polypi, or of masses of dysmenorrhœal membrane with blood or clot, all conditions described as hæmatometra, are more likely to be mistaken for pregnancy than for ovarian disease; but some of the signs of pregnancy will certainly be wanting, and the signs of enlargement of the uterus are sufficient to distinguish this condition from ovarian disease.

Hydrometra, again, is recognised by the enlargement of the uterus without the other characteristic signs of pregnancy, before any watery discharge clears up doubt. Many supposed cases of hydrometra have undoubtedly been cases of ovarian cysts emptying themselves through the Fallopian tube into the uterus and vagina.

Physometra is a very rare condition—generally the result of decomposition of part of a retained ovum, or of blood clot. The resonance on percussion of the enlarged uterus is sufficiently characteristic. I have never seen a case where a collection of air in the uterus caused an abdominal tumour, but Dr. Yarrow of Washington has treated the subject of Physometra in an able paper published in the 'American Journal of Obstetrics,' August 1883. He gives the history of a very remarkable case where an abdominal tumour extending far above the umbilicus, with much lateral enlargement, entirely disappeared with a rush of pent-up gas devoid of odour, on passing a uterine sound.

Now, bearing in mind the various symptoms and signs of pregnancy while the uterus is still a pelvic tumour, and afterwards when the uterus has enlarged, risen, and become an abdominal tumour, it will be seen how they resemble and how they differ from those which characterise ovarian cysts and tumours, uterine tumours, and extra-uterine fœtation.

When an ovary is only slightly tumefied, it usually lies behind the uterus and may be felt by vagina or rectum, or better still by combined examination with one finger in the rectum and one in the vagina. It does not at all resemble the enlarging uterus of early pregnancy. As the ovary swells, it usually rises up out of the pelvis; but it sometimes remains low down either from pressure or adhesion, and as it grows it pushes the uterus either to one side, or backwards, or forwards. It may restrict the mobility of the uterus, but the independence of the one of the other may generally be made out. Increasing in size, the ovary may rise into the abdomen and leave the uterus quite in its normal position, without any deviation or modification of mobility, or alteration in the cervix; or it may drag up the uterus quite out of reach, elongating the vagina, so that nothing but the ovarian tumour can be felt through the vaginal walls; or the os may just be reached, high up above the pubes if the ovarian cyst is behind the uterus, or near the promontory of the sacrum if the cyst is in front. This displacement of the os backwards by a cyst in front of it simulates pregnancy, but other signs are wanting. In case of doubt, delay of a month or two would clear it up.

It is possible that the rate of growth of an ovarian tumour may closely resemble the rate of the enlargement of the uterus in pregnancy; but it is much more likely to advance at a very different and much less regular rate, and to remain for weeks or months without much alteration in size. The fœtal movements and heart sounds are wanting, and there is probably a less dense or solid, if not a distinctly fluctuating tumour.

The distinction between pregnancy and fibroid tumour or enlargement of the uterus will be alluded to hereafter.

RENAL CYSTS AND TUMOURS

The diagnosis of ovarian tumours from cystic growths and enlargements of the kidneys is usually made with a readiness which renders a mistake quite an exception. But occasionally an exact diagnosis is impossible. And sometimes, it is only after an exploratory operation, or after the death of the patient, that a mistake is discovered.

The first case of the kind, which came under my care, was one of soft cancer of the right kidney in a girl only four years old. She was supposed to be suffering from ovarian disease. Her appearance is shown in the woodcut.

The diagnosis in this case was made without much difficulty, although the urine was quite normal. The growth was extremely rapid; hardly six months from its commencement to its fatal termination —when the diseased mass weighed between 16 and 17 pounds. The tumour occupied the whole of the right side of the abdomen, bulging backwards in the right loin. It was uniformly elastic, but no fluctuation could be detected. The intestines were pushed downwards, and to the left side. The rapid growth, and the absence of fluctuation, were, of course, strongly against the opinion that the tumour was ovarian; while the rarity of ovarian disease in young children, and the comparative frequency of renal encephaloid, led to a diagnosis which was confirmed by a puncture with a fine exploring needle. A few drops of reddish serum were obtained, containing nucleated cells of varied size and shape. After death the whole kidney was found infiltrated with encephaloid. Although so enormously enlarged, the shape of a normal kidney was distinctly preserved. Its surface was soft and elastic, in some spots giving a sense of deep-seated fluctuation; but no cyst was found, nor were there any marks of suppuration or hæmorrhage. Coils of small intestine adhered to its inner and under surface. The ureter was occluded by the pressure of the tumour. The left kidney was quite healthy. Thus the normal condition of the urine was explained. The diseased kidney added nothing to the contents of the bladder, and the healthy kidney supplied only normal urine.

The following remarks on this point by Dr. Roberts, of Manchester ('Urinary and Renal Diseases,' p. 444), are well worthy of serious consideration. He says: 'The presence of cancer cells in the urine is a sign which usually figures prominently in the catalogue of symptoms of renal cancer, but its value is very doubtful. It is by no means an easy matter to identify cancer cells in the urine, in consequence of their similarity to the transitional epithelium of the pelvis and ureter. . . . In two examples of renal cancer, with hæmaturia, which I have had an opportunity of observing, repeated and careful examination of the urine failed to discover the presence of cancer cells. Mr. Moore ('Med. Chir. Trans.' xxxv. 466) believes that he succeeded in identifying cancer cells in the urine drawn after death from the bladder of a man in whose kidneys cancerous nodules were found; but his description rather accords with the appearance of the epithelial cells which are always freely detached from the vesical mucous membrane after death.'

Whether renal cancer be observed in children or in adults—whether it be or be not accompanied by hæmaturia, or by the presence in the urine of albumen, or of epithelial cells from the ureter and pelvis of the kidney—whether the progress of the disease be slow or rapid—whether there may be much, little, or no pain, or emaciation, or gastric symptoms—or great or little effect upon the general health—the abdominal tumour is the most pro-

minent characteristic of the disease. As Bright observed ('Abdominal Tumours,' Sydenham Society's Edit. p. 199): 'The enlargement shows itself much more towards the anterior part of the abdomen than towards the loins.' It is, however, more or less confined to one side of the abdomen and to the corresponding lumbar region, whence, as a rule, it is immovable —and, equally as a rule, some portion of the intestines are fixed in front of it. But in one case an exception was found to these rules. In the 'Lancet' of March 1865 a case is recorded in which an operation was commenced for the removal of a supposed tumour of the left ovary. The patient was in one of our general hospitals, and it was believed that 'the tumour was ovarian, and that from its great mobility, and the absence of adhesions, its removal would be easy.' Yet the uterus and ovary were found to be healthy, and the tumour to be the enlarged left kidney; which, instead of being fixed, was movable—its peritoneal covering being elongated into a sort of mesentery, admitting of free movements —and, instead of pushing the intestines before it, the descending colon and sigmoid flexure were behind it. This enlargement of a movable kidney added greatly to the difficulty of diagnosis.

The *absence of fluctuation* is the leading sign by which cancerous or other *solid* tumours of the kidneys are distinguished from ovarian tumours; for it is extremely rare to find a large ovarian tumour in some part of which fluctuation cannot be detected. But in some forms of kidney disease fluctuation is as evident as in ovarian cysts. In one case of pyonephrosis I punctured the kidney through the abdominal wall, and so not only cleared up the diagnosis, but restored the patient to many years of health. Cystic degeneration was in another woman attended with symptoms so exactly the same as those seen in enlargements from ovarian tumours, that I only learnt the true nature of the disease by an abdominal incision. And in one of my patients the enormous bulk of a fibro-plastic tumour originating in the right kidney or its peritoneal covering, and weighing 84 pounds, effectually obscured all indications to be gathered from manipulation either externally or by the vagina.

It is evident from the cases just mentioned that both solid and cystic tumours of the kidney may be mistaken for ovarian tumours. Solid renal tumours, whether cancerous or innocent, may resemble the malignant, pseudo-colloid, or cysto-sarcomatous tumours of the ovaries; while different varieties of ovarian cysts may be closely simulated by different forms of pyelitis and pyonephrosis, hydronephrosis, cystic degeneration, and the growth of hydatids in the kidney. The diagnosis may be facilitated by attention to the following propositions:

1. Although intestine is sometimes found in front of ovarian tumours, and sometimes behind movable renal tumours, these are very rare exceptions to the general rule that renal tumours press the intestines forward, and ovarian tumours press them backward. In other words, ovarian tumours are in front of the intestines, renal tumours are behind the intestines.

2. Large tumours of the right kidney usually have the ascending colon on the inner border of the tumour. Tumours of the left kidney are usually crossed from above downwards by the descending colon.

3. The discovery of intestine in front of a doubtful abdominal tumour should lead to a careful examination of the urine. It is possible that one kidney may be diseased and the urine quite normal, because the healthy kidney alone secretes urine. But the rule is that either blood, pus, or albumen, or characteristic epithelium, is detected—or some history may be elicited of their having been detected at some former period.

4. If any doubt be entertained whether a substance felt between an abdominal tumour and the integument be or be not intestine, percussion will not always solve the doubt, because the intestine may be empty and compressed. But (*a*) an intestine when rolled under the fingers contracts into a firm, cord-like, movable roll; (*b*) the patient may be conscious of the gurgling of flatus along it, or the gurgling may be heard on auscultation; (*c*) the intestine may be distended by insufflation, after passing a long elastic tube through the rectum.

5. Ovarian and renal cysts may both be subject to great alterations in size. When the kidney is the seat of disease the fluid usually escapes by the ureter and bladder. An ovarian cyst can only empty itself through the bladder, or into

an intestine, or through the coats of the vagina, after adhesion and a fistulous opening. It may discharge through the Fallopian tube and uterus. In either case the physical and chemical characters of the fluid discharged will be the chief guide in diagnosis.

6. If a correct history can be obtained, it may be expected that a renal tumour has first been detected between the false ribs and ilium, and that it has extended first towards the umbilicus, next into the hypochondrium, and lastly downwards towards the groin. An ovarian tumour has, in all probability, been first noticed in one inguinal or iliac region, and has extended upwards and inwards.

7. It is only a very small ovarian tumour, with a long pedicle, which could be mistaken for a floating or movable kidney. The latter may be recognised by its characteristic shape, though it is often so misplaced that the hilus is turned upwards. The kidney is usually felt between the umbilicus and the false ribs, and may be pushed upwards and downwards, or laterally, to a varying extent, or into the lumbar region to the normal position of the kidney. When the kidney is pushed away from this position, the sound on percussion there becomes tympanitic.

8. Just as renal tumours are usually associated with some evidence or history of hæmaturia, calculus, albuminuria, nephritic colic, or some notable change in the quantity or state of the urine, so ovarian tumours are usually associated with some change in the quantity and regularity of the discharge, or with suffering at the catamenial periods, and with some alteration in the mobility or situation of the uterus. But as in some rare cases of renal disease the urine may be normal, so in some rare cases of ovarian disease there may be nothing abnormal to be discovered in any of the pelvic viscera, nor in their functions.

By bearing these facts in mind an accurate diagnosis may be made in a very large proportion of cases. Some rare cases of exceptional difficulty may, however, be occasionally expected.

DISTENDED BLADDER

A word of caution may not be superfluous, reminding the young practitioner that the bladder, distended with urine, has, in several instances, formed a tumour, which has been mistaken either for an ovarian cyst or for ascites, and has been tapped, in some cases with a fatal result. I was once present in an hospital when a woman was about to be tapped. The peculiar projection immediately above the pubes at once struck me, and I suggested that the catheter should be introduced. Five pints of urine passed, and the tumour disappeared. In this case the patient was supposed to be suffering from incontinence of urine from pressure of the imaginary cyst. But the urine which dribbled away was simply overflow from the paralysed bladder. Distension of the bladder is of common occurrence both in uterine and ovarian tumours which are fixed in the pelvis. In some cases it is only by the use of a small and long elastic catheter that the bladder can be reached and emptied. This is especially necessary in cases of uterine tumour, where it is not rare to find the bladder drawn up nearly to the level of the umbilicus. In some cases of cancer of the bladder, where the growth extends to the uterus, and the bladder is distended with urine, mistakes are only avoided by using the catheter.

FÆCAL ACCUMULATIONS

In his 'Clinical Lectures on the Diseases of Women,' Simpson says that there had been 'in the hospital a patient who was sent from the country, and presented on admission the colour and appearance of a person labouring under some malignant disease. The facial expression might have led you to believe that she was the subject of a cancerous diathesis. She had a tumour in the left hypogastric region, about the size of a fist. But under the use of croton oil it readily disappeared, and proved to be only a mass of fæces in the colon. You might suppose that it would be difficult to mistake such a tumour for any kind of morbid growth, and you might imagine that the patient would be suffering from such a degree of constipation as at once to indicate its real nature. But there is not of necessity any degree of constipation present. On the contrary, there is sometimes diarrhœa. The peculiar feeling of such a tumour will generally enable you to decide as to its true character: it feels like no tumour that I

know of. On being examined either through the abdominal walls or through the rectum, it is felt to be hard and resistant; but if one finger be pressed steadily upon it for one or two minutes, it will at last indent like a hard snowball, and, as there is not the slightest elasticity about it, the indentation remains after the pressure is removed. If any doubt should still remain, the persevering use of aperients will clear up for you the diagnosis by causing the mass to be dissolved and carried off.'

Although I have several times seen lumps, which were fæcal accumulations, in the region of the cæcum and ascending colon, yielding to the pressure of the finger, and, owing to their containing or being surrounded with gas, having a degree of resonance on percussion, yet I have only met with one of such a size as to be mistaken for an ovarian tumour.

Some years ago I was summoned to Chester, and on arriving found that the case was one of obstructed intestine. Stercoraceous vomiting had been going on for many days, and the lady was almost moribund. The abdomen was distended beyond the ordinary size at the full time of pregnancy, by a well-defined solid tumour, which I should have imagined to be uterine or ovarian but that it was semi-resonant on percussion.

Consulting with Dr. Waters as to the performance of Amussat's or Nélaton's operation, I thought it better to commence by an exploratory incision, in order to ascertain what the abdominal tumour was. On dividing the peritoneum the tumour appeared exactly like a very large uterus, but on passing my hand under its lower border I found the uterus and both ovaries healthy. On percussing the tumour there was sufficient resonance to show that it was either intestinal or a cyst containing air, and further examination convinced me that it was the cæcum and colon enormously distended. I accordingly performed a modified Nélaton's operation, first stitching the peritoneal coat of the cæcum to the peritoneal edges of the incision in the abdominal wall and then opening the gut. More than two pailfuls of semi-solid fæcal matter escaped, and the gut rapidly contracted as it became empty. I could not ascertain what the cause of the obstruction had been. The patient recovered, and some months afterwards I closed the artificial anus. She died in 1884. No examination of the body was made.

PELVIC CELLULITIS AND ABSCESS

It is not often that ovarian tumours, even when they are confined below the brim of the pelvis, are mistaken for pelvic cellulitis or abscess. But it is probable that many of the cases of supposed cures of ovarian or uterine tumours were merely inflammatory exudations into the pelvic cellular tissue, which were either removed by absorption or terminated in suppuration and the discharge of the pus by the rectum, vagina, bladder, or skin. In 1871 I saw a lady who had been supposed to suffer from ovarian disease, in whom a pelvic abscess discharged not only through the rectum, the bladder, the vagina, and in one loin, but gravitating down the leg, opened in the calf. A suppurating ovarian cyst may end in the same way; but the history of the case, the severe pain, the high temperature at the onset of the disease before any considerable tumour had formed, the remarkable almost bonelike hardness and fixity of the swelling, as if inseparably connected with one or other ilium, and the flexure of the thigh from the way in which the psoas muscle is involved, are sufficiently characteristic of cellulitis. It is very seldom that an ovarian cyst shows any tendency to point in the situation where there is the greatest tendency to point in pelvic abscess, that is in the roof of the vagina, very near the cervix uteri, either behind or in front or to one side of it. An ovarian cyst, or a pelvic abscess which had burst into the peritoneal cavity, would be attended by the same symptoms of perforating peritonitis. But in one case the previous history would have been that of pelvic cellulitis, in the other that of an ovarian cyst which had become inflamed, or had burst after twisting of the pedicle. It is seldom that a pelvic abscess extends upwards above the umbilical level. Hardness may be felt in one or other iliac region or above the pubes, and a corresponding hardness or swelling may be felt by the vagina, behind or in front or to one side of the uterus; and, if pus have formed, fluctuation may be detected. An ovarian cyst is not so firmly fixed in the pelvis; even if adherent there, it does not give the same impression

of close attachment to the pelvic bones. It rarely leads to such troublesome dysuria, to such rectal pain or tenesmus, to such constant throbbing, or to such enforced quiescence of one or both lower limbs; and the general outline of an ovarian cyst can be more easily traced than the diffuse bulging of a pelvic abscess. The swelling in pelvic abscess is harder, more painful on pressure, and accompanied with nervous pains such as are usually called sciatica or pelvic neuralgia. It is not often that an ovarian cyst suppurates until it has existed for many months, or has attained a large size; but the whole course of a pelvic abscess, from its commencement till the discharge of pus is effected, is seldom more than from 3 to 4 weeks.

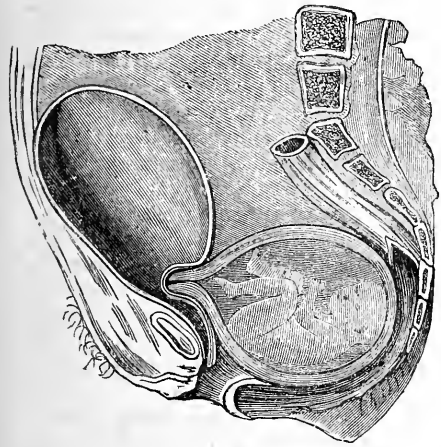
HÆMATOCELE

As in pelvic cellulitis, so in hæmatocele, it is only a small ovarian tumour which has not risen out of the pelvis, or a large ovarian cyst which has suppurated, that could be mistaken for either the early and small or the later and large stages of pelvic cellulitis or hæmatocele. A small hæmatocele in the early stage produces much the same local conditions, is accompanied by very similar pain, and almost as much general fever as pelvic cellulitis, and is apt to be associated with about the same amount of pelvic peritonitis. Indeed, it is very probable that many of the cases of pelvic cellulitis take their origin from a hæmatocele. Some blood escapes into the loose cellular tissue in the neighbourhood of the uterus about the time of menstruation; a clot forms, does little harm by itself, but pelvic cellulitis is set up, which ends in abscess, the clot which excited it disappearing. It is only when the effusion of blood is large and sudden, its escape through the Fallopian tube prevented, and its general diffusion in the peritoneal cavity limited by peritonitis and adhesions, that a distinct pelvic or abdominal tumour is formed. It is rarely that such a tumour extends as high up as the umbilical level; more frequently it is either within the pelvis, behind or to one or other side of the uterus, and barely to be felt through the abdominal wall. These characters are quite sufficient to distinguish it from a large ovarian cyst. Small ovarian cysts do not commence so suddenly, are not so closely associated with the catamenial period, nor is their advent ushered in by such acute pain or febrile disturbance. An ovarian cyst is seldom dangerous to the life of the patient before it has attained considerable size, whereas a hæmatocele of very moderate extent and of sudden formation may be either rapidly fatal or lead to very dangerous symptoms.

The following narrative may serve to illustrate the above remarks, and I have seen several similar cases. A young lady was travelling from Paris to London. She was menstruating and caught cold. The day after her arrival there was considerable swelling in the right iliac region, with extreme tenderness. The symptoms became more intense during the next few days, and when I saw the patient her sufferings were so excessive that the examination could only be made when she was under the influence of chloroform. The abdominal swelling was principally confined to the right side, and extended as high as the false ribs. The uterus was fixed, pushed forwards and to the left, and there was distinct pointing in the vagina behind and to the right of the uterus. The possibility of the existence of an ovarian cyst which had rapidly enlarged and become acutely inflamed was carefully considered, but the history of the case indicated so clearly hæmatocele followed by pelvic abscess, which was pointing towards the vagina, that puncture by the vagina was urged, and was only deferred owing to the absence of a member of the family, and in the hope that as the abscess was distinctly pointing it would open spontaneously. A few hours after this consultation, sudden collapse and the well-known symptoms of perforating peritonitis set in, followed by death the next day. In another case, a hæmatocele passed below Poupart's ligament, and I opened it in the thigh. It was completely cured by drainage. It had been taken for psoas abscess and spinal disease; but examination by the vagina led to a correct diagnosis.

As curiosities of surgical experience, but not arising sufficiently often to call for more than passing notice, and as morbid changes which may possibly be mistaken for ovarian disease, may be enumerated encephaloid tumour of the ilium, enchondroma or osseous tumours projecting from the sacrum, angular curvature of the lumbar vertebræ,

enlargement or malignant disease of the lumbar glands, or dissecting aneurism of the aorta. I know of one case where a tumour in the pelvis was punctured by the vagina; the patient died from bleeding before the surgeon left the room, and after death it was found that an aneurism of the aorta above the bifurcation had dissected downwards behind the peritoneum, and formed a considerable tumour in the hollow of the sacrum. I have seen three cases where encephaloid disease, arising in the cancellated bony tissue of the ilium, had not only projected backwards and towards the buttock, but so far inwards and upwards as to form a considerable abdominal tumour. In one of these cases the abdominal tumour transmitted a distinct pulsation from the aorta. In another the growth



itself was pulsatile. In the third the rectum was completely occluded by the growth. The other states above enumerated scarcely need further remark; a little attentive consideration of the history and progress of the cases will be sufficient to distinguish them from any form of ovarian disease.

The accompanying woodcut may serve to illustrate a combination of retroverted gravid uterus with distended bladder, which might possibly become the cause of an error in diagnosis.

As a sequel to the preceding observations on diagnosis, it is well to draw attention to the best

MODE OF INVESTIGATING AND RECORDING CASES

Whenever a patient with an abdominal tumour falls under the notice of a medical student, or consults a practitioner, the case should be investigated and recorded. It requires a great deal of practice to do this in a systematic manner. Much that has been said on the diagnosis of ovarian from other abdominal tumours, and of the different kinds of ovarian tumours, should be borne in mind; but something is very likely to be overlooked if the investigation is not conducted methodically. I very soon found that the best and most convenient plan was to have a separate note-book for every patient, and successive editions of this note-book have been published by Messrs. Churchill—the sixth in 1881. Translations have appeared both in French and Italian. I and many of my friends have found these note-books so useful, that I can with considerable confidence recommend their general use.

On the first introduction of a patient, one of these note-books is inscribed with her name and number of reference, and any letter received from the usual medical attendant, or from any friend of the patient, may be pasted in. Years afterwards the advantages of this habit of preserving the originals, rather than copying extracts, may be found. As the note-books accumulate, they may be arranged in distinct divisions, according to the nature of the case, and bound together about twenty to each volume.

As soon as a patient is seen, a note-book is taken, and the first page is at once filled up. The date of the visit is inserted with the index number, and then a few questions are necessary to enable one to fill in the answers as to name, age, residence, occupation, conjugal condition, number and ages of any children, and the name of the usual medical attendant. It saves a great deal of trouble in after years if these particulars are noted very fully and accurately; and the surgeon may then proceed to note all that he can see and ascertain for himself by inspection of the patient, before he proceeds to question her further. This plan will be found to save much time, the subjective examination being limited to particulars which the objective examination has shown to be important. Even then the first visit or consultation is necessarily a long one; but time and thought and tax on memory are spared at subsequent visits.

It will be observed that four pages are taken up by the objective examination,

or the notes of what the surgeon can see for himself without asking any questions of the patient. These are grouped under the general head, 'State at First Visit.' All the particulars as to the general appearance of the patient, her complexion, the degree of emaciation, her habits of life, and the state of the surface of her body, have some special signification, as pointed out in the preceding pages on Diagnosis.

Proceeding to inspect and measure the abdomen, a diagram (which differs from those of Bright and others in so far as it has been corrected by photographs of well-formed women) on page 3 of the Note-Book will assist the observer in tracing such outlines of the liver and the spleen and thoracic viscera as he can discover by inspection, palpation, and percussion, and of any tumour which can be seen or felt. A column is marked for the measurements, in inches, of the girth at the umbilical level—of the distance from ensiform cartilage to umbilicus, from umbilicus to symphysis pubis, and from umbilicus to right and left anterior superior iliac spine. Spaces are left for subsequent records of size. At pages 5, 6, the import of the visible mobility of any tumour, and the evidence as to the presence and extent of adhesions, have been pointed out; and the lessons to be learned by percussion and auscultation have been particularly referred to in the sections on Ascites, Renal Cysts, Pregnancy, Uterine Tumours, and Tympanites. The points to be observed in the examination of the pelvis have been fully described when considering the diagnosis of pelvic cellulitis, hæmatocele, uterine tumours, and pregnancy. It is hardly necessary to add the very obvious caution not to use the sound, to ascertain the length of the uterine cavity, in any case where pregnancy is at all probable. But it may not be out of place to urge that examination of the uterus by the rectum is often more useful, and affords much more information, than is commonly supposed. By the vagina the os and cervix are felt and any flexion or version detected; but alterations in the body or fundus, which cannot be reached by the vagina, may often be felt through the rectum.

Proceeding to obtain information as to the catamenia, a few questions become necessary; and so with regard to the urinary and digestive organs, the nervous system, and the state of the heart and lungs. In an hospital the house surgeon or clinical clerks, and in private life the busy practitioner, are apt to pass over these pages as of no great importance, or to defer the necessary examination to some future day; but it is very important that it should be done well and thoroughly before any course of treatment is determined. These points are all indicated, and room left for answers to questions on pages 4, 5, 6, and 7 of the Note Book.

Having completed the examination as to the state of the patient at the first visit, the page (8) relating to the family history, place of birth and residence, the influence of soil, climate, water-supply and drainage, and the mode of life of the patient should be filled up, especially noting any moral causes, previous diseases, or accidents which may have preceded and possibly have influenced the origin and progress of ovarian disease. This may not appear very important in each case by itself, but as the basis of statistical information, it may become of very great consequence. Then we proceed to investigate the early symptoms of the disease, carefully noting, on pages 8 and 9, the first signs of ill-health, and a number of symptoms which are more or less generally complained of, pretty much in the order in which they are enumerated as 'Early Symptoms.'

The succeeding page contains a list of the symptoms usually noticed as the disease progresses either to spontaneous discharge of fluid or rupture of the cyst, or until tapping is practised and repeated, or some further treatment has to be considered.

A space is left on the next page (11) where the surgeon should enter his diagnosis as fully as he can, and then endeavour to estimate the probable duration of life if palliative treatment only be adopted. A note of the general treatment recommended may then be made, including, of course, such rules of living, especially with reference to air and diet, clothing and exercise, as may be advised. Notes of medical and surgical treatment follow, and in the following page (12) the progress of the disease at subsequent visits may be noted and marked on the diagram.

If ovariotomy be performed, all the essential particulars of the operation may

be noted in the order sketched in the three succeeding pages.

A page is then left for a description of the tumour, and seven ruled pages follow for the progress of the patient after operation, daily and hourly notes of temperature, pulse, and respiration, and of any medical or surgical treatment. Another page is left for the result, and a few blank pages follow for the subsequent history.

It is very desirable to ask every patient who recovers to write, once every year on the anniversary of the operation, giving full particulars as to her state of health—if unmarried when operated on, if she has remained so, or has married since—if she has borne children, with any information as to change of name or address, which may render communication easy if desired.

CHAPTER III

PALLIATIVE AND MINOR SURGICAL TREATMENT OF OVARIAN TUMOURS

The sum of doctrine on the medical treatment of ovarian tumours amounts to this: palliate where you can; do no mischief where you cannot. The state of health of the patient is the first consideration. All matters of diet, hygiene, tonics for the body, and consolation for the mind, are to be regulated and administered under the conviction that whatever tends to support the strength and cheer the spirits of the patient does as much as can be done in arresting the progress of a disease which, in its essentially parasitic character, flourishes under despondency and preys upon weakness.

The local miseries which we have to alleviate mostly arise from pressure or congestion. The due action of the bowels and bladder is interfered with, the veins are pressed upon, and œdematous swelling of the extremities shows itself. The area of the chest is encroached upon and breathing is made difficult, a teasing cough supervenes, or the heart is embarrassed and the brain action enfeebled. Common sense will suggest the fitting choice of sedatives or stimulants, aperients or enemas, the use of the catheter, changes of position, the application of bandages or mechanical supports, and the possibility of relief sometimes to be obtained by manually altering the position of the tumour when it is low down or impacted in the pelvis.

Conception is a possibility which must always be borne in mind. It is true that pregnancy may proceed to its end, and labour be accomplished without much more than ordinary difficulty; yet the complication is a cause of just anxiety, and may give rise to a state of things which renders the question between palliative measures and removal of the tumour no longer one of choice.

But, independently of the troubles incident to the ordinary course of the disease, accidents will happen. The patient may get some local injury from a blow or a fall, or she may be chilled. Inflammation is set up in the tumour or in the peritoneal covering, and judicious treatment is called for. Absolute rest, fomentations or poultices, and opium, with or without mercury, must be used so as to avoid, if it can any way be averted, the complication of pus formation or plastic adhesions.

Many medicines have been proposed for the cure of ovarian cysts. Either no good has been done, or, where benefit has followed the use of the remedy, there has been a mistake in diagnosis. So with the supposed value of drastic purgatives and hydragogues; if used when the dropsy is ovarian they have often done harm, rarely good. When they have done good, fluid has been free in the peritoneal cavity or discharged into it. Some years ago I met with a curious illustration of this statement. I was asked to see a young lady in consultation with Dr. Headlam Greenhow, who had ascertained the presence of a large single ovarian cyst, and recommended tapping. Dr. Marsden had also seen the patient. He believed the disease to be ascites, said that tapping was unnecessary, and that he could cure the patient by calomel and elaterium. I quite agreed with Dr. Greenhow. The danger of tapping seemed to me to be very much less

than the danger either of spontaneous rupture, or of rupture accelerated by purging. This was fully explained to the friends, but they chose the medical rather than the surgical treatment. It is only fair to the memory of Dr. Marsden to say that his treatment was followed by complete success, but I have no doubt that a thin cyst gave way, its contents escaped into the peritoneal cavity, were absorbed, and were carried off by the watery motions excited by the calomel and elaterium. Repetition of similar treatment would be followed by many failures. I only record the case as a warning to those who would condemn such attempts as invariably useless, and to show the necessity of explaining the possibility of their occasional success.

Whenever an ovarian cyst or tumour has attained so large a size that the comfort and health of the patient are interfered with, it may be taken as certain that ordinary medical treatment will be of little avail. Any specific medical treatment by iodine, or bromine, or mercury, or gold, or arsenic, or lime, or potash, used with the hope of checking the growth of such tumours, must be as useless as any diuretics or other medicines expected to lead to absorption of the contents of the cyst; and it would be well if the rule were adopted to prohibit any medical treatment which could possibly injure the health of the patient, or place her in a less favourable condition than she otherwise would be for such surgical treatment as may ultimately be called for.

The question when surgical aid really is required, or how long a patient should be left to ordinary medical care, undisturbed by any surgical treatment, is one which is daily occurring in practice, and the answer should be framed upon some such common-sense rules as the following: so long as the patient does not suffer much pain, is not annoyed by her size and appearance, has no great difficulty in locomotion, and so long as the heart and lungs, digestive organs, kidneys, bladder, and rectum perform their functions tolerably well, nothing need be done. Life is not immediately threatened, and by watching the advancing symptoms the moment for action can almost always be determined. But with the experience of the 12 years which have elapsed since the publication of my edition of 1872, I have become more and more disposed to advise the removal of an ovarian tumour as soon as its nature and connections can be clearly ascertained, and it is beginning in any way physically or mentally to do harm, since the risk of the operation under such circumstances is certainly less, and the possible evils of delay are eluded. Where, however, the distress of the patient forces her to demand some kind of relief, and there is either reluctance or refusal to face the average risk of excision, or family considerations impose the necessity of delay, the size, nature, and connections of the tumour must guide us in the selection of one or other of the minor methods of palliative surgical treatment, which, though they seldom lead to a cure, have the advantage of enabling us to alleviate the most distressing symptoms, and to wait for an opportunity to try some of the expedients adopted for the obliteration of the cyst, or to carry out the last resource of ovariotomy.

These palliative measures, or substitutes for ovariotomy, may be thus enumerated:

1. Simple tapping through the abdominal wall.
2. Simple tapping through the vagina.
3. Simple tapping through the rectum.
4. Tapping followed by pressure.
5. Tapping and the formation of a permanent intra-peritoneal opening in the cyst wall.
6. Tapping and drainage, or the formation of an opening through the abdominal wall, the vagina, or the rectum.
7. Incision.
8. Tapping followed by injection of iodine.

TAPPING

As experience has increased and the mortality after ovariotomy has diminished, professional opinion has been unsettled as to the use or propriety of tapping ovarian cysts. Some writers—Stilling, for example—have gone so far as to assert that it is an operation which ought to be completely abandoned. Few surgeons would assent to this, but there are many who object to tapping on two grounds—first, that it is dangerous in itself, and can only be of temporary utility; and secondly, that it is likely to be followed by adhe-

sions or other conditions which add greatly to the danger of subsequent ovariotomy.

In considering the objection to tapping on the ground of its danger, as compared with the danger of ovariotomy, some writers appear to me to have fallen into error. They take a certain number of cases of ovarian disease, and say that so many patients died after one tapping, so many after five, six, or ten, and conclude that tapping is a very fatal operation. I have heard it gravely asserted that it is a more fatal operation than ovariotomy, because after ovariotomy nine-tenths of the patients recover, while after tapping, sooner or later, they all die. But the very important distinction is overlooked between an operation which either cures or kills, and one which only fails to save life, or kills only under most exceptional circumstances.

It is seldom that a surgeon is called upon to perform ovariotomy in order to save a patient from imminent death. But this does occasionally happen. Wiltshire published a case where a woman, who was dying from bleeding into an ovarian cyst, was saved by immediate ovariotomy. I have been sent for twice to operate under similar circumstances, but both patients were dead before I arrived. Large veins had burst, and some pounds of blood were found inside ovarian cysts. If, in any of these cases, the death of the patient had followed ovariotomy, it could hardly be said that this operation had killed the patient; it had only failed to save life. So, if a patient be near death, either poisoned by an ovarian tumour in a state of gangrene from twist in the pedicle, or by the fetid contents of a suppurating cyst, or after bursting of an ovarian cyst into the peritoneal cavity, ovariotomy, if performed unsuccessfully, may be said to fail in saving life—it cannot be said to kill. Yet I have many times operated successfully under such desperate circumstances. In any such case, ovariotomy must be compared with trephining, tracheotomy, herniotomy, or the ligature of some large artery in a case of wound or burst aneurism, or primary amputation of a limb in compound fracture. It is not the operation which is the cause of death, but the disease or accident from the effects of which the patient is not saved by the operation.

But in the large majority of cases of ovariotomy there is as much time for discussion as in the case of lithotomy. And in both cases the responsibility of operating with the full knowledge that, if the patient be not saved by the operation, he or she is killed by it, must be fairly faced. It is true that death would almost always be caused by the stone or the ovarian tumour; but it might be at a distant period, and if death follow the operation in a few days, the operation must then be regarded as the immediate cause of death.

Tapping stands on a totally different ground. As a rule, when a patient dies after tapping, it is not that tapping has hastened her death, but simply has not succeeded in saving her life. Her life may have been prolonged by repeated tappings, but at last she dies worn out by the disease.

Tapping may be practised — first, through the abdominal wall; secondly, through the vagina; and, thirdly, through the rectum. Whichever of these methods may be selected, it may be trusted to alone, or it may be followed by pressure, or by the formation of an opening, either in the cyst wall only, with the object of establishing a communication with the peritoneal cavity, or, for drainage, through the abdominal wall, vagina, or rectum. In the one case the fluid passes into the peritoneal cavity and is absorbed, no external opening being left; in the other a fistulous external opening is kept up until the cyst ceases to pour out fluid and becomes obliterated. In any of these cases the processes may be assisted by pressure; and in some tapping may be followed by the injection of iodine.

TAPPING THROUGH THE ABDOMINAL WALL

was formerly practised with the patient sitting in a chair, a pail between her legs, an assistant on either side of her, keeping a sheet, or long towels, so tightened round the abdomen by pulling at the ends, that the escape of the fluid was supposed to be assisted, and the fainting of the patient prevented. A hole in the sheet, or a space between two towels, left room for the passage of the trocar. The operator, standing in front of the patient, used the trocar like a dagger, stabbing with considerable force. A good deal of discussion arose at one time as to the propriety of dividing the skin and fascia with a lancet before using the trocar. Some thought it

unnecessarily prolonged the operation, others thought it spared the patient the shock and pain of a forcible stab. Any way the operation was a very distressing one. The fainting of the patient was by no means uncommon; she suffered from exposure and shock, her clothing was often wetted by the fluid, and she was taken back to bed frightened, wet, cold, faint, and exhausted. No doubt some of the dangers of tapping depended upon this clumsy method of proceeding. It is difficult to understand otherwise that the mortality after tapping could possibly have been as high as many writers have estimated it. Simpson's calculation was that the mortality after first tappings was not less than 1 in 6. Under the present simplified mode of tapping, I very much doubt if it is as much as 1 in 60. I believe it has been considerably less than this in my own experience. I have removed 115 pints of fluid from a patient at one tapping, and 121 from another, without the slightest sign of faintness, without wetting either the linen or the bed-clothes, and without disturbing her position in the bed. I have often removed 30, 40, or 50 pints of fluid from patients reclining on one side in bed, and they have been only conscious of the relief afforded by the removal of pressure. They should lie on one side near the edge of the bed, so that the abdomen projects over the edge. As a rule, the linea alba is the preferable site for puncture, but any hard portions of the tumour should be avoided, and the most elastic or distinctly fluctuating points of the tumour selected. Before puncturing, great care should be taken by palpation and percussion to ascertain that no intestine is lying, or adhering, between the cyst and the abdominal wall, at the point selected for tapping; and any visible superficial veins should be avoided. It is certainly advantageous to puncture the skin with a lancet before using the trocar, and if the patient is very sensitive to pain the seat of puncture may be frozen by ether spray. And every now and then with a very nervous subject, or where the excessive accumulation of fat on the abdomen gives a formidable look to the proceedings, and may perhaps occasion some little difficulty in driving the canula to its destination, it may be as well to administer a slight amount of some anæsthetic so as to calm the timidity, or give the operator the opportunity of doing what he has to do with greater facility.

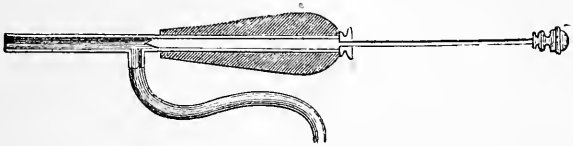
The condition of the cyst wall may also be the cause of embarrassment or danger in tapping. I have many times observed it so far gone in degenerative changes as to make it friable; and though it has been kept entire by the equable support of the surrounding parts, any essays to puncture with a trocar must have crushed it and caused the discharge of the contents. In at least 3 operations where I came upon fluid free in the peritoneum, on examining the cyst, the hole made in a previous tapping was quite open, a piece of inelastic matter having been forced away so that there was no possibility of closing. There have been, too, some examples of bony deposit in the tissue sufficiently hard to turn the point of a trocar. Ritchie reported of one of my cases, a partial thickness of 2 inches, enough to arrest any ordinary operator under the impression that he had come in contact with a solid fibroid. In other multilocular cysts one compartment may have walls of almost impenetrable solidity, and an adjoining one of not more than a line in thickness, so that a first attempt to draw off fluid may be an utter failure and lead to an erroneous conclusion, while the next, from shifting of the position of the mass or change of point of puncture, may fall upon a thin loculus, give vent to the contents, and alter the diagnosis completely.

The trocar has been greatly improved of late years. The old instrument was so short that, if the abdominal wall was thick, the trocar never reached the cyst, or it may just have punctured the cyst, and the canula was too short to follow it. In the first case no good, but no harm, was done; in the second the results were dangerous or fatal. The punctured cyst poured out its contents into the peritoneal cavity, and dangerous symptoms or death followed, the danger arising not from the tapping, but from the bad way in which it was done.

Great difference of opinion has been expressed as to the effect of admitting air into an ovarian cyst while the fluid is escaping. Some writers have argued that it can do no harm. My own opinion, founded upon the few cases where I have been sure that air has entered, is in accordance with those who assert it to be frequently followed by cyst inflammation,

by fever, and by decomposition of the fluid which remains in the cyst, or is secreted soon after the tapping. I therefore regard the improvement in the trocar which provides against the entrance of air into the cyst during the escape of fluid as an important element in the diminution of the mortality after tapping. We are indebted to Mr. Charles Thompson for introducing one of the first instruments by which this object has been attained. In his own words, 'It consists of a cylindrical silver canula about 4 inches long, into which opens at near its middle a short silver conducting tube of the same calibre, to which a piece of india-rubber tubing about a foot long is attached by a screw. In this canula plays a solid steel

piston, with a trocar point, its body being of such length that, when fully pushed forward, as in the above figure, its point protrudes sufficiently from the canula, and its other extremity seals the entrance of the conducting tube; and, when fully withdrawn, as in this figure—



it retires so far as to open the conducting tube. This piston must fit the canula so perfectly as to be air-tight when greased. The little cap of the canula unscrews to admit of the removal of the piston for greasing or cleaning. The outer half of the canula is mounted in a solid wooden handle to give a firm grasp of the instrument.'

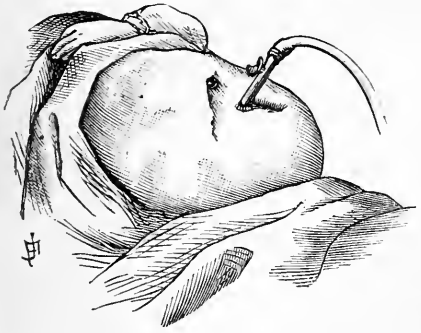
As soon as I read this description of Thompson's trocar, I saw how useful it would be, both in tapping ovarian cysts and in ovariotomy, and I had instruments made with canulas of different lengths and calibre, suitable for both purposes, and continued to use them for some months. I found that admission of air was prevented, the syphon action assisting in keeping up a continuous flow of fluid, while the escape could be stopped at any desirable moment. If the tube or canula became blocked it was easily cleared. The fluid was conveyed into the receiving vessel, while the patient was kept perfectly dry, not alarmed by the splashing of the fluid, and not disturbed by the changing of the basins, which was so troublesome when the old instrument was used.

While still desirous to carry on the principle of the syphon, as adapted to the trocar, I became anxious to avoid the momentary delay between the introduction of the trocar and the escape of the fluid, while the piston was being withdrawn. I was led to this by observing that, when using the large-sized instrument in ovariotomy, there was sometimes a rush of fluid between the cyst and the outside of the canula before the piston could be withdrawn, and it was evident that the same thing might occur during ordinary tapping. After two or three trials, it occurred to me that a hollow piston, something like a steel pen sliding in the pencil-cases in ordinary use, might be a convenient mode of effecting the object in view. I first carried out this idea in an instrument of the size for ovariotomy, adding, to the outside of the canula, grooves upon which the cyst could be tied as it became lax. Modifications which I have since made in this instrument are described in the chapter on Ovariotomy. When the instrument is made of the size for simple tapping, the canula is perfectly smooth. A lancet puncture is made through the skin, and the instrument is then easily thrust into the cyst. Fluid escapes immediately, and the point is withdrawn to prevent injury to the cyst as it contracts. It is important that the edges of the canula should not be thin, but perfectly smooth and well rounded off. There would otherwise be danger of injury to large veins on the inner surface of the cyst; and the maker should be careful, in sharpening the cutting end of the hollow trocar, to leave one half of the lips quite blunt. If sharpened all round it would act as a punch, and cut a circular hole in the skin. I have seen a tube blocked in this way, and more than once a round piece of skin floating in the

fluid, or so nearly detached after the canula was withdrawn that it was better to cut it away. If the instrument is properly finished, only a semilunar cut is made in the skin and cyst, which closes much more readily than the triangular puncture made by the old trocar.

Instead of the india-rubber tube, it is quite easy to fix to the end of the canula an ordinary india-rubber enema syringe, by which more powerful exhausting suction can be brought to bear upon the contents of the cyst than can be obtained by the syphon tube; and if it be desirable to wash out the cyst, or to inject iodine or any other antiseptic into it, this can be readily done by reversing the syringe without removing the canula.

When using this syphon trocar, care should be taken so to introduce the instrument that the point passes into the fluid at a lower level than at the commencement of the tube, as shown in the sketch.



Air will not descend except under strong suction, or into a vacuum, and there is no fear of air passing up the tube and down the canula into the cyst. The instant the canula enters the cyst, fluid rushes into it, pressing the air before it, and if the tube be properly mounted so that it does not bend or narrow the canal, the tube, which should be about three feet long, at once becomes the long arm of a syphon. The atmospheric pressure and syphon action of this long column of fluid are so great, that the air can be heard bubbling into the tube through the well-fitting bayonet joint provided for the withdrawal of the point of the instrument. It is better to keep the end of the tube under the fluid when the cyst is nearly empty, to avoid any accidental drawing inwards of air as a patient makes some deep inspiration or expiration, leading to a kind of vacuum within the abdomen. In withdrawing the instrument it is always well to press the abdominal wall close down upon the cyst, and with the finger and thumb of the other hand so to hold the abdominal walls together behind the escaping canula as to prevent any entrance of air.

Instead of the syphon-trocar some surgeons have used aspirators of different sizes and modifications. But they are all open to the objection that as the cyst becomes empty its flaccid walls are sucked into the end of the canula and stop the flow of fluid.

Should any bleeding follow the removal of the instrument and not be stopped by a little pressure, a hare-lip pin may be passed completely across the opening, deeply enough beneath the skin to compress any injured vessel. Two or three turns of silk twisted round the pin make sufficient pressure to stop any bleeding. It will not do simply to bring the edges of the skin together with a pin; this might only conceal dangerous internal bleeding. In some cases internal hæmorrhage, even fatal, has followed the puncture, and this may be explained either by the opening of varicose vessels in the cyst wall, where they sometimes attain enormous development, or by the presence of such enlarged veins in the omentum as were found in the examination of the woman operated on as my 731st case, where the size was such as to have made the suppression of bleeding impossible without immediate laparotomy. One of my neighbours lost a case within a few hours after tapping; upwards of five pints of blood, which had escaped from a varicose vein, having been found in the peritoneal cavity. The vein ran directly in front of the peritoneum, immediately beneath the linea alba, from the umbilicus towards the liver. A pin through the whole thickness of the abdominal wall would have compressed this vessel.

Whenever it is doubtful if a cyst has been completely emptied, or there is some escape of fluid after the removal of the trocar, the comfort of the patient is greatly increased by closing the opening with a hare-lip pin and twisted suture, but the pin need not be passed so deeply as in case of bleeding. I was led to adopt this practice from the remark made to me by Mr. Cæsar Hawkins upon a case where oozing after tapping was going on. He

said, 'When they ooze they always die,' so I determined that they should not ooze unless I wished to drain. In ordinary cases a pin is not necessary, a small pad of lint and a strip of adhesive plaster being quite sufficient to cover the opening. The abdomen should be supported by an ordinary binder.

In order to prove that simple tapping through the abdominal wall is occasionally followed by a radical cure, I can refer to many cases in my note-books. Sometimes it has been necessary to empty the cyst a second time; and, contrary to expectation, there was no return of filling in one case where I had drawn off fluid dark brown in colour and rather viscid. Some of the earlier patients remained under observation for many years after the operation. For the most part they kept in good health; a few died of other diseases, while others married and had children. In one case I tapped the patient only the day before she was married. She became pregnant at once, and has had several children since, without any refilling of the cyst.

My experience accords with the conclusions drawn by Dr. Méhu from his researches on the abundant material supplied to him by the hospitals and practitioners of Paris, that in spite of a few exceptional cases, it is only when single, and probably broad-ligament or extra-peritoneal cysts, are tapped, and clear, non-albuminous fluids are evacuated, there is a reasonable hope of fluid not again accumulating.

In order to weigh the value of the various objections to tapping, I have gone over the records of my first 500 cases of ovariotomy. 265 of these 500 patients had been tapped previously, from 1 to 18 times. 193 of these tapped patients recovered, and 72 died, giving a mortality of 27·16 per cent.

The general mortality of the 500 cases was 25·4 per cent., and 235 patients, or nearly one-half, had never been tapped. In them the mortality was 23·4 per cent., just 2 per cent. less than the general mortality. In other words, the mere fact that a patient has or has not been tapped (so far as can be judged from 500 cases in the hands of the same operator) does not affect the result of the operation by more than 2 per cent. Indeed, the mortality of the patients not tapped, though less by about 10 per cent. than that of the patients who had been tapped twice, is greater than that of the patients who had been tapped once and three times. Thus 140—or rather more than one-fourth—had been tapped once, and the mortality was 23·57 per cent. Of 32 who were tapped three times, the mortality was 21·87 per cent. Of the 49 who were tapped twice, the mortality was nearly the same as that of the group of cases tapped from 4 to 18 times, namely 34·69 per cent., or about 1 in 3.

An investigation of the details of subsequent cases confirms the impression that the mortality of ovariotomy is but little affected by previous tapping. The fact of a patient not having been tapped, or having been tapped very often, is by itself of little or no value in prognosis. I have stated elsewhere that such adhesions as are apt to follow tapping do not greatly increase the mortality after ovariotomy; and I can now add that in some of the patients who have been tapped most frequently there were no adhesions, and there were firm adhesions in some who had never been tapped.

Although more impressed of late years by the danger of putrefactive changes in the fluid after tapping without antiseptic precautions, I still adhere to the following propositions:

1. That in cases of simple ovarian or extra-ovarian cysts, it is right to try the effect of one tapping before advising a patient to undergo a more serious risk. But in compound or multilocular cysts the third proposition holds good.

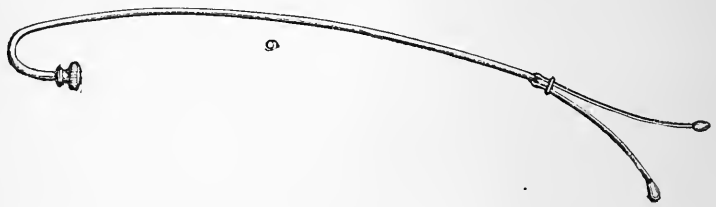
2. That one or many tappings do not increase considerably the mortality of ovariotomy.

3. That tapping may sometimes be a useful prelude to ovariotomy, either as a means of gaining time for a patient's general health to recover—of clearing the urine of the albumen with which it is sometimes charged under the mere influence of pressure—or of lessening shock, by relieving her of the fluid a few hours or days before removing the solid portion of an ovarian cyst; and

4. That when the syphon-trocar, which I brought before the profession in 1860, is carefully used in such a manner as to prevent the escape of ovarian fluid into the peritoneal cavity, and the entrance of air or of putrefactive material into the cyst, the danger of tapping is extremely small.

TAPPING THROUGH THE VAGINA

is more liable to be followed by inflammation of the cyst than tapping through the abdominal wall, because it is not easy to prevent the entrance of air. We should always endeavour to avoid this accident by attention to the level of the canula, but the attempt does not invariably succeed. The operation of tapping through the vagina is selected not so much with the intention of simply emptying the cyst, as for the chance that, should the fluid escape by the opening as fast as it is secreted, the cyst may gradually contract and the puncture close. This favourable result, however, is seldom secured. As a rule, air enters the cyst, the opening fills up, and the fluid remaining in the cyst, or that freshly secreted, putrefies. Suppurative inflammation of the lining membrane of the cyst comes on, and is accompanied by a low form of septic fever or pyæmia, which can only be relieved by maintaining a free outlet for the discharge. The frequency of these consequences should make tapping through the vagina an exceptional practice. But it may be adopted in cases where an ovarian cyst is bound down in the pelvis by adhesions, and it is necessary to relieve the distress caused by pressure on the bladder and rectum. The puncture should then be made where the fluctuation is most evident, but as near the median line as possible. The canula, or an elastic catheter, may be left in the cyst, though it is safer practice either to introduce a wire seton, or a drainage tube, so as to prevent the opening from closing, and make sure of the free and immediate escape of any fluid that may be secreted. Whether a canula or tube be used, it is necessary to adopt some contrivance to prevent it from slipping out; and I find a piece of wire doubled at the inner end answers this purpose well. The ends open out, as shown in this drawing, and maintain either canula or tube in the cavity until the wire is withdrawn.



It is now about 20 years since I treated a case of ovarian dropsy in this way. This shows my reluctance to face the risks incurred by it. Though none of my early cases had an immediately fatal result, and two of them were followed by restoration to perfect health, the others died within a few years, either from exhaustion by the continuous discharge, or from recurring suppuration.

It must always be borne in mind that, to carry out this practice with any chance of success, the opening, which is not merely for evacuation, but drainage, must be free and well placed, so as to avoid the possibility of any accumulation. The utmost cleanliness must be observed, injections of sulphurous acid, or some other disinfectant, are incessantly required; and everything must be done to promote the health of the patient.

The impression left on my mind by what I have seen of vaginal tapping, leads me to the conclusion that simple tapping is more hazardous than tapping followed by drainage, and that drainage should be so complete that no reaccumulation of fluid can take place, the cavity being kept open until its walls collapse and unite, so that it is completely obliterated. Even then, patients are so apt to suffer from some of the ill effects of long-continued suppurative processes, that I am more than ever confirmed in the opinion that it is better, even at considerable risk, to remove a cyst, if at all possible, than to trust to any mode of drainage.

TAPPING THROUGH THE RECTUM

has been supposed to possess some advantages over tapping through the vagina. It was said that there would be no constant discharge of offensive fluid, for any ovarian fluid which entered the rectum would be retained, just as a liquid motion is retained by the sphincter ani, and discharged when the patient pleased. But a dysenteric tenesmus has been occasionally

observed, which has proved very distressing. It was supposed that the objection to vaginal tapping from entrance of air into the cyst would be guarded against in rectal tapping by the contraction of the sphincter ani. But the entrance of fæcal gas into a cyst would be quite as likely to occur, and would be more injurious than the entrance of atmospheric air in vaginal tapping. Fatal inflammation has followed the entrance of fæcal gases into the cyst. I had one such case with Dr. Priestley. We tapped an adhering cyst through the rectum, and the patient died some days afterwards of cyst inflammation. The cavity was filled with fæcal gas.

INJECTION OF IODINE

Notwithstanding the advocacy of Boinet, the practice of injecting ovarian cysts with iodine has quite fallen into discredit; and, so far as my own trials and means of observation enable me to judge, not in any way to the disadvantage of patients. The few cysts which I injected and which did not refill for several years were single, with limpid contents, and in such cysts I believe tapping is as effectual alone as it is with the injection of iodine in addition.

The only cases in which iodine injection is really useful, and where its employment should be recommended, are those in which, after tapping either by the abdominal wall, vagina, or rectum, cyst inflammation has occurred, and the patient is suffering from absorption of the decomposing contents of the cyst. Here free drainage becomes necessary to save the patient from pyæmia or septicæmia; but she may suffer considerably in appetite and strength if the fluid which escapes is offensive; and it ought to be deodorised. For this purpose iodine, or phenol, or sulphurous acid, or chromic acid may be used in tolerably strong solution; and iodine I used to think preferable to all the others. A solution of 1 part of iodine and 2 of iodide of potassium to 20 parts of water was used night and morning, injected through the catheter after washing out the cyst with warm water; and the greater part of the iodine solution injected was allowed to run away again at once. But a little was left in the cyst, partly to act on its walls and partly to deodorise the fluid contents of the cyst if they putrefied. Latterly I have had reason to prefer sulphurous acid to iodine. I have used with excellent effect a mixture of one part of the acid of the British Pharmacopœia with 6 or 8 parts of tepid water.

TREATMENT BY INCISION

The practice of laying open ovarian cysts by incision no doubt arose when, during tapping, the instrument used proved to be too small for the escape of thick fluid. On withdrawing the canula it would be found filled with glue-like matter, and similar matter would be observed exuding from the opening. The natural result would be that the surgeon would enlarge the opening, until the contents of the cyst could escape or be squeezed out. This has occurred to me more than once. I was present when Mr. Armstrong Todd tapped a young lady. After a little fluid had escaped, the canula became clogged with hair and fat, and it was withdrawn. Fluid continuing to ooze away, the opening was enlarged until first one finger, then two, and then a tablespoon could be used to scoop out many pounds of semi-solid fat, with masses of hair and bony spiculæ, from a cyst which was intimately adhering over a large extent of the abdomen. Ovariotomy was proposed to the parents, but they preferred the alternative of drainage, and the patient only survived a few days.

In another case, where the contents of a large cyst consisted of colloid, I made an incision 2 inches long, and squeezed out many pounds of matter. In this case relief was given for a time, but the patient ultimately died exhausted from the continuous discharge.

In the cases hereafter described, where it has been impossible to complete ovariotomy, and the cyst, or a portion of it, has been left within the abdominal cavity, the edges of the opening in the cyst have been fixed to the abdominal wall by suture, and such cases have become similar to those treated by incision. I have not adopted the practice of incision under any other circumstances, but it has been repeatedly done by others, and various means have been taken to prevent the escape of the fluid into the abdominal cavity. Adhesion between the cyst and the abdominal wall has been secured by caustic issues, or by the insertion of needles, or by the use of special instruments, or by suture after laying bare the cyst. As soon as adhesion was believed

to be complete, the incision was made, and the cyst kept open until the obliteration of its cavity took place. So far as I can learn, from my own experience and the study of recorded cases, this practice is far more dangerous than ovariotomy, and very much less likely to be followed by complete cure. I think, therefore, it should only be considered admissible in cases where ovariotomy cannot be completed. Then after incision and emptying the cyst as far as possible, and securing the opening in the cyst to the opening in the abdominal wall, the cavity is kept empty by draining and the injection of disinfecting or deodorising agents. The conditions are then the same as those of a drained abscess.

CHAPTER IV

THE RISE AND PROGRESS OF OVARIOTOMY

Ovariotomy. From ὠάριον, ovary; and τομή, incision. [Syn. *Ovariotomie*, Fr. and Ger.—*Ovariotomia*, Ital. and Sp.] Ovariotomy, as performed by surgeons when one or both ovaries are diseased, is a very different proceeding from the extirpation of healthy ovaries, which has been practised from remote antiquity on domestic animals for economical purposes, and both in ancient periods and in the Middle Ages on women, almost exclusively for immoral purposes.

At the present day it seems to be a common practice among some of the natives at the antipodes. Dr. Junker reports that the aborigines of Australia and of New Zealand perform ovariotomy on young girls by incision in both inguinal regions. They do this for two purposes: to prevent the propagation of hereditary diseases and deformities and other disabilities, and to keep up a supply of barren prostitutes.

It was not earlier than in the 17th and 18th centuries that ovariotomy was proposed and suggested as a radical cure for diseased ovaries. As late as the beginning of the 18th century this operation was first performed, and it remained long in discredit. It is only within the last 30 years that it has been at all frequently or generally practised.

The subject began to be discussed by surgical writers in the 17th century. But they got no farther than an expression of belief that extirpation of dropsical ovaries, if it could be done, would lead to a permanent cure of the disease. In the first 50 years of the next century the operation was not only admitted to be possible, but was recommended, though with so many qualifying conditions that no one did it. Some authorities, such as De Haen and Morgagni, opposed it altogether, while a few more sanguine prophesied its ultimate success. Later on, in our own country, the Hunters took up the question.

Dr. William Hunter, in a paper 'On Cellular Tissue,' published in 1762, says: 'It has been proposed by modern surgeons, deservedly of the first reputation, to attempt a radical cure by incision or suppuration, or by excision of the cyst.' Having pointed out difficulties during the operation, and dangers following it, in support of his opinion 'that incision can hardly be attempted,' he concludes with the following words, which foreshadow some of the recent modifications in the operation: 'If it be proposed, indeed, to make such a wound in the belly as will *admit two fingers or so*, and then *tap the bag and draw it out*, so as to bring its root or peduncle *close to the wound of the belly*, that the surgeon may cut it without introducing his hand, *surely in a case otherwise so desperate it might be advisable to do it*, could we beforehand know that the circumstances would admit such treatment.' (*Op. cit.* p. 45.)

In a lecture delivered in 1785, John Hunter has this passage: 'I cannot see any reason why, when the disease can be ascertained in an early stage, we should not make an opening into the abdomen and extract the cyst itself. Why should not a woman suffer spaying, without danger, as well as other animals do? The merely making an opening into the abdomen is not highly dangerous. In a sound

constitution, perhaps, a wound merely into the abdomen would never be followed by death in consequence of it.'

Not many years later (1798) ovariotomy found an enthusiastic advocate in Chambon ('Maladies des Femmes'). He concludes a speculative chapter, on its applicability to other diseases besides ovarian dropsy, with the words, 'I am convinced that a time will come when this operation will be considered practicable in more cases than I have enumerated, and that the objections against its performance will cease.'

John Bell, of Edinburgh, never performed ovariotomy, but in his lectures dwelt with peculiar force and pathos upon the hopeless character of ovarian tumours when left alone, and upon the practicability of removing them by operation. Ephraim McDowell, a Virginian, and a student in Edinburgh, attended Bell's course of lectures in 1794. It is said of him by his biographer, Gross, that he was 'enraptured by the eloquence of his teacher; and the lessons which he imbibed were not lost upon him after his return to his native country. It is not improbable that the young Kentuckian, while listening to the teaching of the ardent and enthusiastic Scotchman, determined in his own mind to extirpate the ovaries of the first case that should present itself to him after his return to his native country. The subject had evidently made a strong impression upon him, and had frequently engaged his attention and reflection. He had thoroughly studied the relations of the pelvic viscera in their healthy and diseased conditions, and felt fully persuaded of the practicability of removing enlarged ovaries by a large incision through the walls of the abdomen.'

McDowell returned to Kentucky in 1795, and commenced practice at once; but it was not until 14 years afterwards that he was consulted (in 1809) by a patient upon whom he performed ovariotomy.

No one can dispute the validity of the direct claim of McDowell as practically the first successful ovariotomist. At the same time it must be maintained, that the still greater merit of pointing out the absence of any physiological reasons against the operation, the possibility of its safe performance in the human female, and the class of cases in which it ought to be admissible, is due to the teaching of the Hunters and of John Bell. But in this country, such is the sacredness of human life, even when threatened by fatal disease; so strong is the consciousness that the introduction of innovations like ovariotomy insures the destruction or shortening of a certain number of lives during the tentative stage of the practice, that men even of the stamp of the Hunters and Bell naturally shrank from the responsibility, imposed upon them by their position and reputation, of adopting and inaugurating it as a part of legitimate surgery. And it must be remembered that, at that time, the mortality from all operations was much greater than it is now; that the diseased were more passively quiescent under their maladies and less tolerant of any surgical suggestions, just as we ourselves find to be the case among the population of an outlying agricultural district; and that they were not buoyed up, as modern women are, by the promises of painless extirpations under chloroform or methylene. Everyone looked upon the ending of the disease in death as a matter of course; and this led to stolid endurance and contentment with such relief as medicine and tapping could afford.

But McDowell was a free man, in a new country, clear from the conventional trammels of old-world practice. He found his patients in the most favourable conditions of animal life, and seems to have had one of those incomprehensible runs of luck upon which a man's fate and reputation so often turn if he has the sagacity and energy to put such fortunate accidents to good account; and was happy, as those usually are who can afford or constrain themselves to wait, in finding suitable time, place, persons, and opportunity for working into fact the notions of his tutor Bell. He lost only the last of his first 5 cases of ovariotomy, and thus, as it were, established at the outset what until recently was regarded as a satisfactory standard of mortality for so serious an operation.

The details of his first operation, as recorded by Gross, are interesting enough for repetition:

'It was performed on Mrs. Crawford, of Kentucky, in December 1809. The tumour inclined more to one side than the other, and was so large as to induce her professional attendant to believe that she was in the last stage of pregnancy. She

was affected with pains similar to those of labour, from which she could find no relief. The wound was made on the left side of the median line, some distance from the outer edge of the straight muscle, and was 9 inches in length. As soon as the incision was completed, the intestines rushed out upon the table; and so completely was the abdomen filled by the tumour that they could not be replaced during the operation, which was finished in 25 minutes. In consequence of its great bulk, Dr. McDowell was obliged to puncture it before it could be removed. He then threw a ligature round the Fallopian tube, near the uterus, and cut through the attachments of the morbid growth. The sac weighed $7\frac{1}{2}$ pounds, and contained 15 pounds of a turbid, gelatinous-looking substance. The edges of the wound being brought together by the interrupted suture and adhesive strips, the woman was placed in bed and put upon the antiphlogistic regimen. "In 5 days," says Dr. McDowell, "I visited her, and, much to my astonishment, found her engaged in making up her bed. I gave her particular caution for the future; and in 25 days she returned home in good health, which she continues to enjoy."

'It will not be uninteresting here to state that Mrs. Crawford, at the time of the operation performed upon her by Dr. McDowell, lived in Green County, Kentucky, from whence she removed, some time afterwards, to a settlement on the Wabash River, in Indiana, where she died, March 30, 1841, in the 79th year of her age. There was no return of her disease, and she generally enjoyed excellent health up to the period of her death. She had no issue after the operation. The youngest child, Mr. Thomas H. Crawford, who has kindly communicated to me these facts, was born in 1803, nearly six years before the operation.'

McDowell, as a surgeon, was exceedingly cautious, calm, and firm; paying great attention to the details of his operations and treatment, and selecting and drilling his assistants with much care. Up to the time of his last sickness, he was one of the most active men in Kentucky, and he died, literally, in harness.

McDowell was buried in the cemetery near the scene of his life-work, and in 1879 it was deemed a fitting thing to perpetuate the world-wide association of his name with ovariotomy by a granite obelisk and some characteristic inscriptions.

McDowell's case has long been considered the first ovariotomy on record; for the operation of L'Aumonier of Rouen, in 1776—which Atlee, in his table, enumerated as the first operation of ovariotomy—was in a case of pelvic abscess, which he opened by an incision through the wall of the abdomen above Poupart's ligament, six or seven weeks after parturition. He seems also to have separated the fimbriæ of the Fallopian tube from the sac of the abscess, and to have removed the ovary without any necessity, and without any idea of ovariotomy.

Another case, included in some of the tables of ovariotomy by Professor Dzondi, is one in which a pelvic tumour was cured by drawing out a cyst through an incision in the abdominal wall of a *boy* 12 years old.

Atlee, however (in the 'American Journal of Medical Sciences,' 1849), brought into notice an operation which claims the priority to that of McDowell by more than a century. It is the case of Dr. Robert Houstoun, which may be found in the 'Philosophical Transactions' (London, 1734), under the head, 'A dropsy of the left ovary of a woman, aged 53 years, cured by a large incision made in the side of the abdomen.' From this case it will appear that ovariotomy originated with British surgery, on British ground, inasmuch as though the operation was not one of complete excision of the tumour, it was planned with that intention.

Dr. Robert Houstoun operated, in August 1701, near Glasgow, on a Mrs. Margaret Miller, who since her last confinement, 13 years before, when 23 years of age, suffered from ovarian dropsy. She was much wasted, had great difficulty in breathing, want of appetite and sleep, and bed-sores from long confinement. The tumour had grown to a monstrous bulk. This case is in many respects a very curious one, and the operator's own words are worthy of record. He says: 'After having obtained the patient's consent that, in order effectually to relieve her, I must lay open a great part of her belly, and remove the cause of all that swelling . . . I prepared without loss of time what the place would

allow, and with an imposthume lancet laid open about an inch; but finding nothing issue, I enlarged it 2 inches; but even then nothing came forward but a little thin yellowish serum, so I ventured to lay open 2 inches more. I was not a little startled, after so large an aperture, to find it stopped only by a glutinous substance. All my difficulty was to remove it. I tried my probe—I endeavoured with my fingers, but all was in vain; it was so slippery that it eluded every touch and the strongest hold that I could take. I wanted in this place almost everything necessary, but bethought myself of a very odd instrument, but as good as the best, because it answered the end proposed. I took a strong fir-splinter, wrapped some loose lint about the end of it, and thrust it into the wound; and by turning and winding it, I drew out about 2 yards in length of a substance thicker than any jelly, or rather like glue that is fresh made and hung out to dry; the breadth of it was above 10 inches. This was followed by 9 full quarts of such matter as I have met with in steatomatous and atheromatous tumours, with several hydatids of various sizes containing a yellow serum, the least of them bigger than an orange, with several large pieces of membrane, which seemed to be parts of the distended ovary. Then I squeezed out all I could, and stitched up the wound in 3 places, almost equidistant. The lower part of the wound was kept open by a small tent. Some serosity discharged from it for 4 or 5 days. The wound was covered in its whole length with a pledget spread with some home-made balsam, over that several compresses dipped in warm brandy, then several towels; all these dressings were fastened by swathing her round the body. An anodyne was given several times a day. The next morning the patient was found much refreshed by a good night's rest, the first she enjoyed for 3 months past. After 3 weeks she was able to sit outdoors, wrapped up in blankets, superintending her farm-labourers. She recovered, and lived in perfect health from that time till October 1717, when she died after 10 days' illness.'

Although this isolated case undoubtedly strengthens the claim of British surgery to the honour of originally attempting ovariotomy, it will hardly deprive McDowell of his undeniable merit of having been the first who, guided by scientific principles, enriched modern surgery with the operation which he performed 13 times between 1809 and his death in 1830. The precise number of deaths cannot be ascertained; but of 8 cures there can be no doubt. McDowell's successes were followed up by other American surgeons. In 1822, Mr. N. Smith, of Connecticut, removed a cyst containing 6 pints of fluid, through an incision 5 inches long. He broke down extensive adhesions between the tumour and the abdominal wall and the omentum. The wound was united by means of adhesive plaster and roller. No unfavourable symptom occurred until the separation of the ligature, when an abscess formed, which had to be opened. The patient, 23 years of age, was able to walk after 3 weeks, and speedily recovered. In another case Smith was unable to complete the operation on account of extensive adhesions. He emptied the cyst, and the patient recovered. But the cyst filled again.

In 1823, G. Smith removed an ovarian tumour from a negress, through an incision extending from the umbilicus to the os pubis, after having emptied the contents of the cyst. The pedicle was secured by a ligature. The patient recovered within 25 days.

Lizars, of Edinburgh, was the first to attempt ovariotomy in this country. He performed 2 operations in 1825, of which the first was successful, the second fatal in 56 hours. He opened the abdomen on 2 other occasions, but only to prove errors of diagnosis. Both patients recovered.

The first attempt to perform ovariotomy in London was made in 1827, by Dr. Granville, who operated in 2 cases. In one the operation was abandoned on account of the extent of the adhesions; the woman recovered. In the other case a fibrous tumour of the uterus, weighing 8 pounds, was removed; but the patient died on the third day.

The ill-success of Lizars and Granville, who both operated by the long incision, brought discredit upon the operation; and it was not until 1836, 9 years after Granville's failures, that a provincial surgeon, Jeaffreson, of Framlingham, acted upon the suggestion of William Hunter, and performed ovariotomy by the small incision for the first time

in Great Britain. A bilocular cyst was removed through an opening only an inch and a half long. The patient afterwards gave birth to 1 boy and 3 girls, and was alive in 1859, 56 years of age.

In the same year (1836), another provincial surgeon, Mr. King, of Saxmundham, successfully removed an ovarian cyst through an incision 3 inches long; and Mr. West, of Tonbridge, also had a successful case, the incision being only 2 inches long. In 1838, Mr. Crisp, of Harleston, removed a multilocular cyst through an incision only 1 inch long. The patient lived 15 years after the operation, and enjoyed good health.

In 1839, Mr. West, of Tonbridge, had a second successful case; a single cyst, which contained 22 pints of fluid, having been removed by the short incision. Mr. West also had an unsuccessful case of completed ovariotomy, and one in which the adhesions prevented the completion of the operation. In the same year the first attempt to perform ovariotomy in a London hospital, of which I have been able to find any record, was made at Guy's, by Mr. Morgan. A small incision was made, adhesions were found, the tumour was not removed, and the patient died in 24 hours.

In 1840, Benjamin Phillips operated at the Marylebone Infirmary, and completed the operation for the first time in London; but the result was unsuccessful.

In 1842, Dr. Clay, of Manchester, commenced his series of operations, performing ovariotomy 4 times, and in 3 out of the 4 with success. In 1843, he also operated 4 times, twice successfully. In 1843, Aston Key removed both ovaries from a patient in Guy's Hospital. His incision extended from the ensiform cartilage to the pubes, and death followed on the 4th day. Later in the same year, Bransby Cooper operated in the same hospital by the long incision, and removed a large multilocular cyst, but the patient died on the 7th day.

So that 42 years ago, although ovariotomy had been performed with success in 1 case in Scotland, and in at least 10 cases by surgeons in our own provinces, it had never been performed successfully in London. It was the good fortune of Mr. Walne to perform the first successful operation in London, in November 1842; and he had 2 other successful cases in May and September 1843. In that year, and in 1844, Dr. Frederic Bird had 3, and Mr. Lane 2 successful cases. Mr. Lane's first patient was still alive in 1867, and had 7 children. In 1843 and 1845, Mr. Southam, of Salford, and in 1845, Mr. Dickson, of Shrewsbury, published successful cases. In 1846, Mr. H. E. Burd operated, his patient recovered, and had a child 2 years after the operation.

In the same year Mr. Solly took advantage of an unsuccessful case which occurred in his practice in St. Thomas's Hospital to point out that retraction of the pedicle behind the ligature is very likely to occur and to lead to fatal hæmorrhage, unless prevented by great care. His published lecture on this case contains a masterly review of the arguments for and against the operation, which must have had considerable effect upon the mind of the profession at the time.

The year 1846 is also noteworthy in the history of ovariotomy. In the month of September, Cæsar Hawkins performed the operation for the first time successfully in any London hospital. Even now, after this long interval, with all our accumulated experience, it is not only interesting but useful to look back upon this initial glimpse of success and reopen the pages of the clinical lecture which was its record and commentary. The cautious deliberation with which the operation was decided upon, the attention to all the maxims of scientific surgery which went with every step of the work, the skill and precaution with which it was executed, and the judicious after-treatment of the patient, all offered an example for imitation as much as the lecture furnished a lesson for study in the exactitude of its details, the lucidity of its expositions, and the judiciousness of its advice. It was a simple case admirably recorded. Mr. Hawkins did not repeat the operation, and his example was not much followed by others for several years. Dr. F. Bird and Mr. Lane were the only operators in London, except Dr. Protheroe Smith, who had successful cases. Dr. Clay continued his operations at Manchester, and successful cases were recorded by Dr. Elkington, of Birmingham, and by Mr. Crouch, in

1849, and by Mr. Cornish, of Taunton, and Mr. Day, of Walsall, in 1850.

In 1850, Mr. Duffin inaugurated a new era in ovariotomy, by raising the question of the danger of leaving the tied end of the pedicle within the peritoneal cavity, and by insisting upon the importance of keeping the strangulated stump outside. He was brought to the resolution of adopting this extra-peritoneal treatment of the pedicle not by any accidental necessity, but by 'reflecting on the fatal termination caused, as it appeared to him, on separation of the slough, by putrefactive decomposition within the peritoneal cavity.' It suggested itself to him that 'this latter consequence, as well as the irritation caused by the ligature in the abdomen, might be obviated by keeping the tied portion completely out of the cavity.' He determined, therefore, to fix the end of the pedicle outside the edges of the wound; but in the only case he reported, he was obliged to content himself by stitching the cut extremity and ligature in the wound. It answered completely. The only objection was the dragging of the abdominal wall towards the spine; but no adhesions formed, and the abdomen soon returned to its natural form.

Whatever may be our opinions and practice at the present time, and whatever views we may hold upon the question whether this extra-peritoneal treatment of the pedicle has advanced or retarded the success of the operation, Mr. Duffin's arguments led to great changes and results—to the use of the clamp and to all the modifications of treatment attendant upon it, and ultimately to researches as to the physiological and pathological phenomena of ligatured stumps within the peritoneal cavity, and to the study of the important subject of drainage by Kœberlé and others.

Some German writers think that the credit here given to Duffin should be awarded to Stilling; because in 1841 he published a case in which he sewed the pedicle with a part of the cyst between the lips of the wound in the abdominal wall, after he had stopped the bleeding by torsion, ligature, and the cautery. But this can hardly be called a truly extra-peritoneal treatment. It is more like what Langenbeck in 1851 described as 'Einnähen,' and Storer in 1867 as 'pocketing the pedicle.' It was after Duffin that Stilling adopted a complete extra-peritoneal method by transfixing the tied pedicle with a needle outside the closed wound. Martin afterwards thus far varied Stilling's method, sewing only the peritoneal coat of the pedicle, instead of the base of the tumour, to the abdominal wall. This question was first discussed in any work of authority by Erichsen, in the first edition of his 'Science and Art of Surgery,' published in 1853. He had then done the operation twice—one very successful case related in the work, and one where the operation was not completed. These operations were performed in 1852.

I began work in London in 1853, and in the following year joined what is now called the Samaritan Hospital. At this time I did nothing but out-patient work, and in January 1855 went off to the Crimea. But in the April before, I had made my first acquaintance with ovariotomy. Baker Brown invited me to see him operate, and I went with Mr. Nunn and assisted him. It was his 8th case, a dermoid cyst with adhesions, which made the proceedings long and troublesome. Nine days after, the patient died of what we can now recognise as septicæmia. This so influenced Brown that he only did one more case, and that unsuccessfully, during the next four years and a half, saying that 'it was of no use, peritonitis would always beat one.' I was not favourably impressed, but had learnt how some of the great difficulties might be overcome so far as the operation itself was concerned. Away from England, in all the excitement of war-surgery, of course the subject was at rest. But after my return in 1856 I resumed out-patient work in Orchard Street. We did not often see cases of ovarian disease at that time, but they did appear occasionally. As I have said, Brown had given up the operation; very few others were attempting it, and most men were lapsing into the old state of indifference, if they were not loudly protesting against it. During the autumn of 1857 a young woman was under treatment for what appeared to be an ovarian tumour on the left side. Opinions were confidently expressed that this could not be an ovarian tumour, because intestines could be felt in front of it. But I determined to see what it was, and in December 1857, 27 years ago, I prepared for my

first ovariotomy. Reflecting upon all the ways and forms of using the ligature, I had resolved to use the écraseur for the division of the pedicle, as was done, some months after the publication of my suggestion, by Dr. John L. Atlee. We cleared out the waiting-room, got a bed there, and secured a nurse. As soon as I opened the peritoneum, and it was proved beyond all doubt that the tumour was behind the intestines, I was induced very unwillingly to close the wound and do nothing more. The patient recovered without any bad symptom, but died 4 months afterwards in St. Bartholomew's Hospital, when it was found that there was a tumour of the left ovary, which might have been removed quite easily. This was not encouraging for a beginner, but it attracted the notice of Mr. Bullen, of the Lambeth Workhouse, and he offered me a patient then in his infirmary who had been tapped 3 times in Guy's Hospital and 4 times in Lambeth Workhouse, and had had iodine injected. As she was willing to face any risk, I did ovariotomy for her in February 1858. The pedicle was treated by whipcord ligature, the ends hanging out at the lower angle of the wound after the fashion of Clay, Bird, Brown, and the earlier ovariotomists. At that time we had a house-surgeon, Mr. Cooke, and greatly owing to his constant care the poor girl recovered. She became a nurse in the hospital, went into service, then emigrated, and I heard of her in 1868, married to the German overlooker of a large estate in Queensland, whose salary was 240*l.* a year. Had ovariotomy not been performed, she must have died in 1858 a pauper in a workhouse.

Between this 1st case, in February 1858, and the 2nd in August of the same year, we had removed to Seymour Street, where the hospital now is, and the 2nd operation was done in one of the rooms in which I afterwards completed the long series of 408 hospital cases.

The 3rd case was in the following November, and happily all the three women recovered. Had they died, such was the state of professional opinion at that time, the progress of ovariotomy might have been sadly retarded.

I lost my 4th ovariotomy without being able to account for the death. It was the first post-mortem I had occasion to make. Dr. Aitken assisted me, and he found that the hare-lip pins which I then used as sutures were bare on the inner aspect of the abdominal wall, the cut edges of the peritoneum were retracted, and a portion of intestine was in contact with the wound, the impress of which was obvious on the surface of the gut. Some coagula of blood and an abundant consistent lymph exudation upon the peritoneal surface of the intestine corresponded with the edges of the incision and the surface of the wound. Recent lymph glued the opposing surfaces of the intestines to each other. I saw at once how much better it might have been if the peritoneal edges had been brought accurately together, and thought of doing this in my next case. But I found instructions in text-books and treatises carefully to avoid the peritoneum. These doctrines were at variance with the facts before my eyes. Physiological principles had been overlooked. I did not question them, but now that an important practical question was raised which bore distinctly upon the failure of my operation, I determined to put them to the test. I made experiments upon dogs, rabbits, and guinea-pigs, for which I have been vilified, but for which I do not reproach myself. The preparations which I procured from these animals are still preserved in the Museum of the Royal College of Surgeons. They corroborated what was known before, that abdominal wounds well adjusted unite readily. This was not what I wanted. They proved more, and were the visible, standing evidence which I did want, that though the other tissues might be brought together, if the cut edges of the peritoneum were left free, they retracted; direct union did not take place, and secondary evil consequences resulted. In the specimens where the divided edges or rather surfaces of peritoneum have been pressed together, the smooth serous inner coat of the abdominal wall is perfectly restored. The stitches cannot be seen on the inside, though plainly visible on the skin, and there is no adhesion of intestine or omentum. But in other specimens, where the peritoneal edges were purposely excluded from the sutures, and the animal was not killed for a day or two, intestine or omentum adheres to the inner surface of the abdominal wall, thus completing the peritoneal sac at the great risk of intestinal obstruction, to say nothing of a want of firm union and subsequent ventral hernia.

Without this convincing demonstration in my hands, I might have gone on for years bowing to precepts and oblivious of principles, sometimes taking up the peritoneum and sometimes leaving it loose, with perplexity to myself and danger to my patients. But my lesson was learnt, and I cannot too strongly inculcate it upon others. When skin or mucous membrane is divided, the edges must be brought together to secure direct union. If they be inverted, union is prevented. The exact opposite holds good with serous membranes. The edges should be inverted, and two surfaces of membrane pressed together, so that the sutures are not seen. The effused lymph then makes so smooth a surface that even the line of union cannot be seen. This appeared to be good and promising work for 1859, and I felt that I was announcing what was indisputably true; but, as often happens at first, the fruits did not equal my expectations, for I had the misfortune to lose 5 cases out of the 11 which I did during the year, 3 in hospital and 2 in private practice.

The translation in 1860 of Kiwisch's Chapters on Diseases of the Ovaries by Clay, of Birmingham, with the very valuable tables appended to the work, must be regarded as greatly assisting in the progress of ovariotomy in this country. Baker Brown's success with the cautery, Tyler Smith's revival of the practice of returning the pedicle with the ligature around it, and the numerous published cases of Hutchinson, Bryant, Murray, and other surgeons, all had their share in the general result.

Within the next 5 years I completed 114 operations, and in 1864 published my first book, which was a record of every case, with such commentaries as the experience acquired and the discussions of the day seemed to make it a duty to lay before the public. On taking up this subject as a matter of study and trial, just at the crisis when obloquy was the thickest and opposition the strongest, I felt that nothing but the most open frankness would carry conviction of success, or in case of failure justify the operation. I was not unconscious of the fact that, however much I might devote myself to it as a professional obligation, and as a response to a despairing cry from a crowd of hopeless women, it was looked upon as a surgical enterprise which had baffled others, and from which many had withdrawn discomfited. I therefore pledged myself to make known through the press all that I did and all that befell me, and my book was the formal redemption of that pledge, gathering up as it did all the isolated details of my practice, and the scattered remarks published from time to time in the journals. During this period of 5 years, and in treating, as it then seemed, the long series of cases, nearly all the questions of practical importance and speculative interest came up for consideration, and were rendered intensely pertinent from the urgency of their actual application. Up to the time of my beginning to operate, there was but little concord among my predecessors as to the mode of doing the operation, and scarcely any reference to scientific principles in choosing this or that course. Ignorance of anæsthetics had long kept so formidable a proceeding out of the hands of all but the most daring of surgeons, and out of the thoughts of any but the most desperate of patients. But now, in the calmness of ether and chloroform, and with the possibilities of the older surgeons reduced to demonstrated facts, attention began to be concentrated upon details and accidents. Problems of diagnosis, the means, as Hunter expressed it, 'of knowing beforehand that the circumstances would admit of such treatment,' the relative safety of long or short incisions, the mode of dealing with the pedicle, the tolerance of the peritoneum, the best way of closing the wound, the real value of opium in the after treatment, the temperature and regimen to be observed, the distinction between peritonitis and reaction, the nature and cause of septicæmia, and the after consequences of the operation; all these and other subjects, affecting, by the way in which they might be decided, the results of ovariotomy, were presenting themselves to the practitioner and demanding his judgment. It would have been absurd on my part to pretend that I was arriving at absolute truth, or to enunciate anything like unquestionable maxims. But as facts accumulated, as I became familiarised with difficulties, aware of sources of danger, and learnt, either by trial or from others, better modes of procedure, I formed opinions, acted upon them, and offered them for criticism. I have often regretted that I failed to become sooner acquainted with the

clinical lecture of Cæsar Hawkins, which would have cleared my way through some difficulties, and dissipated some shadows which perplexed me. But on reference to my volume of 1864, it will be seen that I soon came to the conclusion that it was a matter of no insuperable difficulty to decide upon the practicability of the operation, and that an exploratory incision was a justifiable, sometimes useful, and almost always a harmless proceeding. With regard to the incision, it wanted no magician to demonstrate that length was a relative quantity, that it would be as stupid to make a cut ten inches long for the extraction of a tumour the size of a cricket-ball, as it would be madness to try to drag a semi-solid multilocular mass through Jeaffreson's minimum opening. I therefore acted upon the rule of giving myself room according to the size and solidity of the tumour, keeping as near the safe medium length as possible; and when an opening was too small for a large multilocular tumour to pass through as it was, I soon began to break down the interior of the tumour with my hand, thus rendering the operation easier, and insuring its completion in many cases which would formerly have been abandoned.

As to the pedicle there was more hesitation. No one knew exactly what should be done. I tied it and left the ligatures hanging out through the wound, as others had advised. I tied it and let it drop into the abdomen. I fixed it in the wound with a ligature and pins. I secured it outside the wound with a clamp. I cauterised it and left it. I combined the cautery and ligature. I made a solitary essay with the écraseur, and I conjoined and modified most of these procedures. Every plan had its special difficulties and dangers, and one peculiarity of all this tentative work was, that it brought the disadvantages more conspicuously into view than the advantages. It is impossible now, with the results of the experience of more than five-and-twenty years tabulated and criticised, and practice running in two or three equally approved grooves, for anyone to form an idea of the perplexity which formerly made every movement in advance dubious. Circumstances sometimes took away the ground of option, as when the pedicle was too short to be brought out of the wound and clamped. But upon the whole, in accordance with what was the then belief, that a tied pedicle, whether inclosed or left to drain through an aperture, must undergo the process of gangrene and sloughing, the notion of extra-peritoneal treatment was theoretically right; and it was this conviction, together with some practical objections to the ligature and cautery, that led me to give the preference to fixation externally by the clamp. The greater part of the pedicles during this section of my operative work were treated in this way. There were no statistics to judge by, but I seemed to be doing better with it; and later on, when numbers augmented, they proved that the mortality in clamp cases was less than the general average, and vastly lower than that given by the ligature. It is true that the cases I did with the cautery turned out well, but they were few in number; and though Baker Brown was concurrently doing better still with it, I was not assured of the fact at the time. Besides, it is not in the nature of things that one man can guarantee himself the same success as another in adopting his practice, especially when that practice is a matter of manipulation. And further, I must admit such a want of confidence in the efficacy of the cautery as would have morally incapacitated me from continuing the operation by such means. Whether right or wrong, then, the clamp gained its ascendency and I continued to use it. It has since been imputed to me that by so doing I retarded the progress of ovariotomy, by deterring others from venturing upon an operation involving a mortality of 1 in 4 or 5. It is easy to make such reflections retrospectively, and I can only retort that without the leading of the clamp and the support which the clamp results gave to the trial of other surgical expedients, some of those who are the successful ovariotomists of to-day would never have been ovariotomists at all.

The primitive clamp was nothing more than the carpenter's callipers. Mr. Hutchinson introduced them, and his first improvement was to make the handles movable. My first attempt to improve upon this instrument resulted in the manufacture of two fenestrated blades, which were made to exert parallel compression by a screw at each end. After using this instrument for some months I found it less easy of applica-

tion than the modified calliper clamp, and I made some improvements in the latter. I found the most trustworthy was that suggested by Küchenmeister, of Dresden, where oblique ridge and furrow on one blade exactly meet the corresponding elevations and depressions on the other. If properly made, these surfaces, when pressed together, will not allow a piece of fine tissue paper to be drawn between them. The straight instrument lying awkwardly after application, and sometimes causing painful pressure at its angles, I had it curved and all the edges carefully rounded off. I substituted for handles a large pair of forceps made to fit clamps of all sizes. When well made this instrument holds securely in most cases where a clamp can be applied, but occasionally the auxiliary aid of a ligature is necessary; for instance, if the pedicle be made up partly by the thickened Fallopian tube or utero-ovarian ligament, and partly by thin membranous expansions of the broad ligament running towards the colon or cæcum, the clamp alone is not trustworthy. The thin part of the pedicle is not compressed because the thicker parts of the pedicle keep the blades too far apart; and after the cyst is cut away, the thin portion of the pedicle is very apt to slip inwards. I have seen very troublesome bleeding arise in this way, which might easily have been prevented if the circular compression of a ligature had been exerted before the application of a clamp. I attempted to make a circular clamp, but I found that it would cut through some pedicles just like scissors, so that after a short trial I returned to the use of the calliper clamp, with the modifications which I have described. The mode of applying the clamp will be shown, when the various plans of dealing with the pedicle are considered, in the chapter on the operation.

The introduction of the extra-peritoneal treatment, as I have said, had more to do with the fear of shutting up putrefactive matter coming from the strangulated pedicle than anything else. But we all at that time had an exaggerated fear of meddling with the peritoneum. No one had any clear notion of its tolerance of everything that was not in its nature harmful. Men who had cut it open, torn through adhesions on its surface, and left it exposed for perhaps half an hour while they were liberating a tumour, were anxious to shut it up hermetically as soon as they had finished. I was not far behind the ruling opinions, and if anyone had asked me why I united the wound so closely round the pedicle, he would have found the answer in these words in my book: 'The fear is that peritonitis may be set up by leaving *any* opening.' It was a curious instance of inconsistency, because in the very same page I advocate a free opening for the exit of serum if any there should be. It was a remnant of antique superstition, and we had not yet fully learnt to estimate the eclecticism of the peritoneum. We soon, however, found out that while a very little fluid which had no business to be there irritated as much as a sponge, we might profitably reopen, wash, cleanse and drain. The step from this to making a free passage through the vaginal wall was simple, and this I did in my 36th case, thereby saving the life of the patient. Afterwards I had to regret sometimes not having done it with sufficient boldness, and the process which came to be called the toilette of the peritoneum, both primary and secondary, soon made progress, and is now not the least efficient factor of the general success of the operation.

Some of the surgeons who had operated before me placed the patient in a sitting posture near the edge of the bed, with her legs widely separated, her feet supported on stools, and her back and head resting on pillows. A few do so still. I followed this practice in my first three cases; but it was so difficult to keep the patient properly covered, she was so apt to become faint under the influence of chloroform, there was so much difficulty in preventing the escape of the intestines, and in completing satisfactorily the various steps of the operation, that I tried the recumbent position in my fourth case, and I have kept to it ever since.

Two common dressing-tables, placed T fashion, soon commended themselves as better than a special table, and have served me ever since. The recumbent position is incontestably safer for the patient as well as more convenient to the surgeon, and I believe it is partly owing to my adherence to it that through all my operations I have never had any serious trouble from fainting and collapse.

As with my experiments on animals so with my patients, I began closing the wound with hare-lip pins, passing them

through the whole thickness of the abdominal wall at intervals of an inch. Each pin perforated the skin about an inch, and the peritoneum about half an inch from the incision on either side, so that when the two opposed surfaces were pressed together upon the pin, the two layers of peritoneum were in contact with each other. But I soon began to use and prefer sutures to pins, and tried different materials for this purpose. Metallic sutures were then in vogue, and in 1861 I was trying silver. In 1862, remembering the introduction of platinum sutures twenty years before by Mr. Morgan at Guy's Hospital, I used them for my 36th case, to ascertain if any advantage would arise from the employment of a metal which would not oxidise like silver or iron. But I have scarcely ever seen so much suppuration in the track of the sutures as in this case; and it taught me to look to the size of the needle, the size and smoothness of the thread or silk, the tightness with which it is tied, and the time it is left, as having more to do with suppuration or sloughing than the material of which the suture is composed.

Later in the same year I made a series of experiments with various animal and vegetable matters, to ascertain their relative value as sutures and ligatures, ending in a conviction of the superiority of good silk, well twisted, if tied tightly enough to bring the edges of the wound together accurately, yet not so tight as to strangulate the intervening tissues. Silk need never be removed before the 7th day, and may be left till the 9th or 10th, if so desired, without any harm. The fact that I have uniformly used only silk for ligatures and sutures all through the several stages of my gradually improving results, shows that the material is of less importance than the way of managing it. It was not long after changing the pins for sutures in fixing together the edges of the wound that, finding there was a chance of suppuration from their being left too long, and wishing to ascertain how soon they could be removed with safety, I adopted the plan of supporting the abdominal wall with long straps of adhesive plaster, and I still continue to use them and a simple flannel bandage.

In looking over the notes of the period about which I am now writing, it is curious to mark the vagueness of all our notions as to the import of certain symptoms and conditions. Even such a point as the difference between reaction and peritonitis was not clear to every one. My 40th patient was a very young woman, who, in two years' time, had been modelled by her disease into the perfect type of an ovarian martyr, and who rebounded into health with a rapidity absolutely marvellous when once relieved from her oppression.

'At first the sudden removal of such a strain seemed to be almost too much for the system; it seemed as if it were difficult for heart and lungs to play with even balance under so much lighter a task—the pulse was a little hurried, the face flushed, the skin rather hot. But soon we had a free perspiration, and all went well. Just at this time I was a little amused by the different views taken of the case by two worthy friends of mine. Each observed the same symptoms, but interpreted them very differently. One, more at home in the dissecting-room and the dead-house than at the bedside, began to speak ominously of peritonitis, to suggest leeches and calomel and opium, and seemed surprised at my being content to let what I thought well alone. My other friend, a true pathologist, whose life had been passed in watching and treating disease, saw nothing to alarm him in the quickened pulse, the warm skin, or the flushed face; he looked quite delighted, and exclaimed, "What nice reaction!" He exactly expressed my own thoughts, and two small opiates given during the night after the operation to quiet pain, were the only medicines of any kind which this patient took during her convalescence.'

Nor has her subsequent career belied the good augury of her vigorous recovery. She married and bore children, has buried 3 husbands, and was in 1884 in good health.

I have more than once had occasion to refer to my 4th case, and I turn to it again, because there is often much practical good to be gained by sifting the details, or dwelling on the history, of an unfortunate event. I have said that I did not know why my patient died, and at the time that was quite true. In the published table of cases the cause of death was set down as septicæmia. This was an after-thought. For what, in truth, did any of us know about septicæmia in 1859? One may judge how little it was by the way in which I expressed myself

in a paper read, before the Medical and Chirurgical Society, the month after I had operated.

I was asking the meeting to endeavour to help me in estimating the share which each of four agencies that I suggested had in causing the death. I had my doubts about the opium she had taken, for just then it was the custom to use it very freely. I suspected bleeding from the pedicle, at the moment of removing the tumour, might have done mischief. And I was not disinclined to fortify myself against self-reproach by calling to mind the collapse which Simpson had so well described as an accident peculiarly liable to occur after operations about the pelvic organs, and for which no sufficient explanation has been offered. But I emphatically asked, 'Did she die from peritonitis?' adding, 'Some who consider the amount of lymph effused, and the quantity of serum found in the peritoneal cavity, would answer this question unhesitatingly in the affirmative. But I doubt if simple peritonitis was sufficient to cause such sudden collapse. It was partial, confined to the visceral layer opposed to the wounded surface only, not dipping down among the coils of intestine. My impression is, that if peritonitis killed her, it was indirectly, by the formation of a morbid poison. The serum was very acrid, it made Dr. Aitken's hands smart for some time; had he wounded himself, in all probability he would have suffered from morbid poisoning. Had he attended a woman in labour, in all probability that woman would have had puerperal peritonitis. If, then, my patient could generate a poison capable of killing other people, may it not have killed her? It was probably formed only from the inflamed portion of the peritoneum, the other portion being quite capable of absorbing rapidly.' Here then was the idea of poison superadded to that of peritonitis; but the patient was blamed for making it herself, and perhaps fairly, as she had suffered from an eruption of herpes on one side of the chest only a few days before. But nothing was as yet said about the likelihood of its having been brought to her. Two years later I had personal proof of what this poison could do. I pricked myself in examining the body of a patient who died under similar circumstances, and I was ill enough to make me say in writing the report of the case: 'A poison which affected me so severely in a small dose might easily kill anyone in a larger dose. I recovered after the absorption of a fraction of a drop; but the poor woman was overpowered by the quantity taken up by her own absorbents.' Here again one part of the peritoneum was accused of distilling and another part of absorbing the venomous fluid. Now I thought I had learnt a grand practical lesson, which I reiterated in all that I wrote, that our business was to let out this fluid as soon as we saw signs of its collecting in the peritoneal cavity; either by opening the wound or tapping by the vagina, or any other means by which we could give it exit. This policy of ejectment was very well so far as it went, and without question some lives were saved by it. But it was working at the wrong end of the problem. Still the missing link in the ratiocination of this subject was close at hand. A parturient woman fulfilling one of the natural functions of life could not, except under the most abominable conditions, be looked upon as a focus of self-engendering poison. Yet she was occasionally overtaken by puerperal peritonitis, and the cry immediately was, 'Where did it come from?' Importation was the accepted explanation, and accoucheurs fell into the category of 'suspected persons.' I had now the clue in my hand, and in less than a year it led me to an understanding of my difficulties. Two cases, my 74th and 75th, proved fatal, and the surroundings were more than suspicious. This led to the exclusion of all midwifery practitioners from my operations unless they could present a clean bill of health; and subsequently to the declaration, so much quizzed, which was obligatory upon every person wishing to see my hospital cases. Then followed other precautions, and I was to be seen using carbolic acid and the hyposulphites in my ovariotomy wards.

The famous asseveration and prophecy of Sir James Paget before the meeting of the British Medical Association in 1862, 'that some of the deaths after surgical operations were preventible, and that the mortality *will* be reduced if the members of the association will decide that it *shall* be,' were not without influence. At the Cambridge meeting in 1864, I treated of hospital atmosphere, organic germs as

causes of excessive mortality, and commented on the researches of Polli with sulphur and the sulphites. Here then were theory and practice brought into accord, and my quarantine, spongings, pads, wool, drainage, vaginal tappings, and chemical remedies combined the essentials of antiseptic treatment.

The progress of ovariotomy in England has thus been brought to the issue of my first book at the end of the year 1864. It is a simple record of what I did, of the oscillating opinions on many points of practice, of the way in which light dawned upon some of the obscurities of the subject, of the anxious unravelling of some of the mixed threads of logic and experiment which led to definite lines of action, of the discussions, consultations, and workings with a great number of estimable and accomplished men. As none of my cases have since been so fully described, it even now serves as a wreck-chart and a guide.

During the seven years and a half which succeeded, I completed 500 cases of ovariotomy, and in the autumn of 1872 published my book on ovarian disease. I still continued to do the surgical work of the hospital, having been all through assisted by a succession of younger colleagues, among whom I may mention especially Charles Ritchie, Junker, and W. Thomson. The promising career of Ritchie, to my great regret, was cut short by a melancholy accident, and both Junker and Thomson have seized opportunities of distinguishing themselves otherwise than as ovariotomists. It was during this time that Dr. Richardson brought to my notice methylene as an anæsthetic, and Junker invented an apparatus, for its convenient administration, which has been in use ever since. Chloroform had been given from the first with the exception of a few trials of ether and other combinations, but it was quite supplanted by methylene. By its use we have been spared the anxiety and danger, and most of the annoyances which so often attend the employment of other anæsthetics.

The work of ovariotomy was now becoming a matter of routine. Series of hundreds succeeded to series of hundreds, and with regularly diminishing losses. Instruments were new-modelled, and there were modifications of manipulative details and after-treatment, but we were now acting upon principles which kept us pretty nearly in a given course, and made the service of the sick-room comparatively easy. Dr. Bantock and Mr. Thornton were installed as joint surgeons with me in hospital, and not only took a part in my operations, but commenced their own work as ovariotomists in 1875 or 1876.

The incident of Lister's arrival in London in the year 1877 raised the question of the applicability of his system to ovariotomy. The mortality from my own hospital operations being at this time not much more than 9 per cent., I hesitated about venturing upon any untried proceedings which might interfere with results so satisfactory. But Mr. Thornton introduced Listerian practice in all its integrity at the Samaritan, and Dr. Bantock for a time followed his example. Some other novelties, such as Dr. Bantock's non-alcoholic after-treatment and Mr. Thornton's ice-cap a little diversified the routine of our wards.

After 20 years' service as operating surgeon to the Samaritan Hospital I felt myself not only warranted in retiring, but bound to make way for my junior colleagues, and at the end of the year 1877 placed my resignation in the hands of the committee. At their request, however, I retained the post of consulting surgeon. My last ovariotomy as surgeon to the hospital was done on December 12, and after it I made a few remarks to those present, giving a summary of my work in these cases. The following table showed the distribution of my hospital operations over these 20 years:

Years	Cases	Recoveries	Deaths
1858	3	3	0
1859	6	4	2
1860	2	1	1
1861	6	3	3
1862	13	10	3
1863	16	11	5
1864	14	11	3
1865	17	13	4
1866	15	10	5
1867	21	17	4
1868	32	25	7
1869	21	14	7
1870	24	17	7
1871	26	18	8
1872	30	23	7
1873	34	25	9
1874	29	20	9
1875	28	20	8
1876	42	38	4
1877	29	26	3
Total .	408	309	99

Another table, dividing the 20 years into 4 successive periods of 5 years each, gives at once the number of cases, the number of deaths, and the percentage of recoveries:

Series of years	Cases	Deaths	Recoveries
First five years (1858 to 1862)	30	9	70 per cent.
Second five years (1863 to 1867)	83	21	74 „
Third five years (1868 to 1872)	133	36	73 „
Fourth five years (1873 to 1877)	162	33	80 „
Total	408	99	
Last two years (1876 and 1877)	71	7	90 „

It appears from this that in the—

First 5 years . .	about	1	in	3 died
Second and third 5 years	„	1	„ 4	„
Fourth 5 years . .	„	1	„ 5	„
Last 2 years . . .	„	1	„ 10	„

A moment's consideration of these figures, showing the changing proportion between recoveries and deaths as time went on, will carry the conviction that increasing experience had been accompanied by diminishing mortality; and enabled me in the last years of my practice in the hospital, with a return of 90 per cent. of recoveries after operation, to set up a standard of success far beyond what we had reason to hope for under the conditions of a London institution. The way in which my successors have carried on the operative work justifies the course I took in leaving it in their hands, and makes it clear that the patients have no cause to regret the change.

The four years from 1878 to 1881 were memorable to me for two reasons: that during them I completed 1,000 cases of ovariotomy; and that I took up the antiseptic system adopted elsewhere, so as to judge by my own experience, not of its general scientific claims, but of the utility of the Lister spray and dressings in abdominal surgery.

My exclusively private practice began January 1878 with the 888th case, and in the month of June 1880 the number of 1,000 cases was made good. The table which I annex notes in detail the times in which the several series of hundreds were accumulated and other matters connected with them which have a statistical interest.

DATES OF COMPLETION OF THE SUCCESSIVE HUNDREDS OF OVARIOTOMY OPERATIONS FROM 1858 TO 1880

No.	Dates :	Recoveries	Deaths	Cases
1	From Feb. 1858 to June 1864	66	34	100
2	„ June 1864 „ Mar. 1867	72	28	100
3	„ Mar. 1867 „ Jan. 1869	77	23	100
4	„ Jan. 1869 „ Dec. 1870	78	22	100
5	„ Dec. 1870 „ June 1872	80	20	100
6	„ June 1872 „ Jan. 1874	71	29	100
7	„ Jan. 1874 „ Apr. 1875	76	24	100
8	„ Apr. 1875 „ Oct. 1876	76	24	100
9	„ Oct. 1876 „ June 1878	83	17	100
10	„ June 1878 „ June 1880	89	11	100
		768	232	1,000

General mortality, 23·2 per cent.; largest 34, smallest 11.

The whole time occupied was 22 years and 5 months.

Before touching upon the question of what influence the so-called 'antiseptic precautions' or details of the Listerian method have had upon my results, I will explain to what extent their adoption was an addition to my previous practice.

Long before Lister had tried any of his methods, indeed from the very beginning of my practice of ovariotomy, I had insisted upon all possible care in protecting patients before, during, and after operation from all the known causes of excessive mortality; and I took unusual precautions against any risk of contagious or infectious disease being communicated to a patient, and against the entrance from without, or the development from within, of anything which could set up traumatic fever or blood-poisoning. I contended that obstetrics and operative surgery should seldom be permitted in the same building, or by the same surgeon in private practice; and that such an operation as ovariotomy should never be performed where patients with uterine cancer, or offensive discharges of any kind, may pollute the place. In 1875, a separate branch of the Samaritan Hospital was opened, and since that year the surgical wards have been much freer from such sources of danger. The good effects of this change were noted before other antiseptic measures were insisted on, and to such an extent that the death rate after my operations was reduced by one-half. And cleansing or purification of the ward or room, of everything about the operating table and

bedding, of the patient herself and the parts near the seat of operation, of the surgeon, assistants, and nurses, and of all the instruments, sponges, and water used, had been rigidly enforced, before carbolic acid was used, or any antiseptic precaution added to those adopted before 1878.

As the material for tying vessels and uniting the wound, the same pure twisted silk, unmixed with any vegetable fibre, which I have trusted to for about 20 years has been used. Various forms of quilled and twisted sutures have been tried and abandoned. But since 1878, all the silk for ligatures and sutures has been soaked before use in a 5 per cent. solution of carbolic acid or phenol. I have not always boiled the silk, as Billroth and others have done.

Dry dressing of the wound has been continued; but in place of the pads formerly used, of 5 per cent. of oil of tar with 95 per cent. of chalk, either thymol or iodoform gauze, or cotton pads charged with borax or phenol, have been used. These are more comfortable to the patient, and are better absorbents of moisture. As a rule they are not touched before the seventh or eighth day, when the sutures are removed, and the wound is almost invariably found to be completely united.

The two most important additions to previous antiseptic precautions are, first, carbolising the sponges and instruments, and secondly, the use of the spray. I had long insisted on the great importance of always using sponges perfectly purified with sulphurous acid; and after an operation I continue my old plan of keeping the cleansed sponges in a weak solution of sulphurous acid. And during the operation, in addition to washing in pure water, every sponge before use is wetted with a 2 to 3 per cent. solution of carbolic acid or absolute phenol. Soft clean linen cloths, wetted with a warm solution of phenol, may be used to lessen the number of sponges required; and nurses must be cautioned not to put any of the soiled sponges into the solution until after they have been washed with pure water, otherwise albumen may be so coagulated as to prevent thorough cleansing. As nurses often fall into this error, it is well to have two or three different sets of sponges, all carefully numbered, kept separate for the successive steps of the operation.

Nearly all my instruments used in ovariotomy are protected from rust by a coating of nickel. They are then more easily and thoroughly cleaned after use, and the cleaned instruments should be placed before, and replaced during the operation, in trays or dishes filled with a warm solution of phenol.

These additional precautions as to sponges, silk, and instruments, I believe to be really important. I have been always doubtful about the spray. 'Striving to better, oft we mar what's well.' In prolonged operations, I have had reason to fear that its chilling effect upon the patients has been injurious. But I have never once seen any other ill effect which I could attribute to it, nor anything like carbolic poisoning. The misty cloud occasionally obscures the field of operation, but not to any serious extent, and it is always easy to protect the peritoneal cavity against the continued action of the spray by a large warm sponge. After a few trials I gave up thymol spray as useless, and for more than four years past have used a spray of absolute phenol of a strength of one in forty. This I continue to use, believing it to be safer than the irrigation or sponging proposed as substitutes. We require a far greater number of trustworthy experiments, or of comparative observations, made under similar conditions with and without spray, than have yet been made known, before we can receive any satisfactory answer to the questions whether carbolised vapour or air can destroy or render innocuous infective or putrefactive substances or germs floating in the air; or what is the share which the spray, among other additional antiseptic precautions, has had in obtaining the better results which have undoubtedly accompanied their combined employment.

The only modification in the mode of operation which calls for further remark is the very much more frequent, almost constant, employment of the *intra*-peritoneal treatment of the pedicle since the trial of the antiseptic system was begun. For several years, the extra-peritoneal treatment was by far the more successful in my practice. When comparing the results of the two methods at the College of Surgeons in June 1878, I showed that of 627 *extra*-peritoneal cases, 130 had died, or 20·73 per cent., while of 157 *intra*-peritoneal cases, 60 died, or

38·2 per cent., the mortality with the ligature having been nearly double that with the clamp. Latterly this disparity disappeared, and the results from the two modes of treating the pedicle were about equal. I am quite sure that, as has been suggested, the *extra*-peritoneal did not represent the simple, and the *intra*-peritoneal the complicated, cases. The difference was simply that of long or short pedicle. Whenever the pedicle was long enough, I used to employ a clamp whatever might be the complications of the case; and in short pedicles I used the ligature or cautery, whether the case was otherwise simple or the reverse. Before antiseptic treatment was generally followed, septic changes, which are now scarcely ever observed, frequently took place in or about the tied pedicle. Since the additional antiseptic precautions have been adopted the many disadvantages of the *extra*-peritoneal method, which were only counterbalanced as long as greater success lasted, have no longer to be endured.

Another great gain from the antiseptic system is that drainage of the peritoneal cavity is now scarcely ever necessary. In the paper which I brought before the Medical and Chirurgical Society in 1876 on completing 800 cases, I contended that drainage should only be an exceptional practice. But I did not then imagine that it could be almost entirely discarded. I can now say that I have not drained one case in which antiseptic precautions have been taken; and on looking back, I cannot believe that there are more than two or three in which, if a drainage tube had been used, it could have been useful. The simple explanation is, that the mixture of blood, other fluids and air left in the peritoneal cavity, or oozing into it after operation, formerly went through putrefactive changes, and if not drained off produced septicæmia, whereas now no putrefaction takes place, and absorption is quite harmless.

I now come to the question of results. The great hindrance to the success of the operation was, in 1878, the same as it had been 20 years before, when B. Brown quailed before what he called peritonitis, but which we have since learned was really the frequent occurrence of blood poisoning. The difference in respect to this matter was that that which formerly scared us as an incomprehensible mystery, was by 1878 in a great measure understood. We began to see what septicæmia meant, and how it reached our patients. Various precautions had bettered the situation, but the evil was still formidable. This will be seen by looking at my returns for the years 1876–77. In those 2 years I did 152 operations, including both hospital and private patients, and had 29 deaths. This gives a mortality of 18·4. But of those 29 deaths, only 5 were accidents of the operation which we may in some proportion be sure of encountering, such as hæmorrhage, shock or cancer. So that 20 years' experience may fairly be said to have reduced the mortality of the operation upon my uncontaminated patients to 3·6 per cent. The remaining 24 deaths were caused by septicæmia, a mortality of 15·8 per cent. 71 of these 152 patients were in the hospital. Of these, 7 died, all from septicæmia. There were no deaths among them really attributable to the operation. All were from contagion, and but for that would have recovered. Among my 81 private cases during the same time, 5 deaths were more or less directly connected with the operation, and 17 were from communicated septicæmia. This shows how the success of ovariotomy was marred at that time by the great evil which till then had persistently attended it. Still as an operation which, when done, either failed to save life, or was fatal to the extent of 18·4 per cent., ovariotomy was worth doing. But when I could show by my experience that the operation could be done on patients, if screened from the effect of contagion, with a loss of only from 3 to 4 per cent., it became an imperative obligation to seek out some means of giving patients all the benefit of further antiseptic measures. The microbe to which, either as spore or vibrio, septicæmia had been experimentally traced, was like any other beast of prey, to be exterminated or held in subjection. These infinitely small beings, existing everywhere, and multiplying with a rapidity which defies calculation, could not be dealt with like wolves or poisonous reptiles. That was out of the question, and the alternative was, if possible, to prevent their access to our patients; or, failing on that point, to put our patients in such a condition that they did not afford a nidus favourable for multiplication. The mature vibrios offered no great difficulties.

They are anaerobic, and will not live either in air or acid. But the spores are aerobic, with a much stronger vitality, and may be looked upon as the arch-enemy. By force of circumstances we are obliged to pass over the point of defence from invasion, and to restrict our efforts to the accumulation of all hindrances to development in the body to which they find access. Pasteur had already indicated, in a general way, what should be done with the sick and all that pertains to them. Lister presented to us his system as efficient, and, as I have shown, I have now for 7 years adopted all that he suggested, in addition to my own habitual precautions. I have used the carbolic spray; but I have never attached much importance to it, except that it tends to general cleanliness, and may sometimes carry its influence into parts which would otherwise be overlooked or inaccessible, so as to prevent the formation of suitable niduses for the propagation of the spores of the septic microbe. I have systematically passed everything used in the operations through the carbolic solution, have used it for myself and assistants, and have as much as possible enforced washings with it upon the nurses.

The dressings of carbolic or thymol gauze, and boracic wool, have proved satisfactory, as well as convenient, and latterly salicylic wool has been put on in abundance. Every antiseptic principle has been kept in view during the after-treatment. There may have been some shortcomings in the details of my Listerian work, according to the notions of a few enthusiasts; but upon the whole it has been as practically complete as it is in the power of any surgeon not a mere *dilettante* to make it. What has happened in these 7 years is satisfactory; but how far it can be called the result of antiseptic treatment, and how much is due to other coincident changes, must always remain uncertain. The facts, however, are these. From January 1878 to the end of 1884, in private practice only, I have completed ovariotomy in 247 cases, with a loss of 27 patients, making a mortality of 10·9 per cent. If I compare these figures with those of my last 2 years of hospital work, it would seem that no change of importance had taken place, that ovariotomy could be done as successfully without as with antiseptics, since the difference of 1 per cent. in the mortality might be accidental. But if I take the whole 152 cases in the years 1876–77, with their mortality of 18·4 per cent., and place them against my 247 subsequent cases, there comes out at once a change for the better of more than 7 per cent. in the result. This is something, but it might be accounted for otherwise than by antiseptic influences. Then if I go still further, and make it a question of relative mortality from contagion; if I investigate not only the fact of death, but the cause of death, the question assumes another aspect. In the 2 years 1876–77, out of 29 deaths, there were 24 from septicæmia, whereas in the 7 following years, out of 27 deaths, only 10 could be placed to that cause. Here we seem to have proved that antiseptics had done a great deal; for if the old ratio of septicæmia had continued, namely, in the proportion of 1 case of death from it after every 6 operations, I ought to have seen, in the following 7 years, among my 247 operations, at least 40 cases of septicæmia. Again, if I abstract the 7 hospital cases, and calculate only on the 17 which happened among the 81 private cases in 1876–77, the number of cases which would have occurred in the following 7 years, in the same proportion, would have been 49 or 50. That is to say, I had passed 7 years, and done 247 operations with a mortality from septicæmia of only 10 cases, instead of the 50 which I should have had to deal with if the proportion of 1876–77 had been kept up.

If there were no other points to be considered besides those involved in mere figures, a difference of mortality to this extent would be decisive, and I am ready to admit that the Listerian additions to my precautions have been in many respects eminently serviceable. I am further convinced that by the use of antiseptics, especially of phenol, those patients who have recovered have suffered much less from fever, while convalescence has been more rapid than it used to be. Formerly temperatures of 100° to 103° were usual, and 104° to 107° not very uncommon. And the head was cooled by ice in at least half the cases. Now cold to the head is scarcely ever thought of, certainly not used in 1 case in 20, and a temperature of 102° is rare. Recovery with a temperature which never rises above 100° is the rule. This alone is an important step in advance, especially as it affects the well-being of a great majority of the patients, and for those

in hospitals lessens considerably the cost of their maintenance. I have never felt any inconvenience myself, nor have I seen any of my patients suffer from carbolic poisoning. Still as other surgeons have encountered that double objection, it must be taken into account, as well as the depressing influence of the cold spray on a sick woman prostrated by anæsthetics, and the inconvenience caused by its interference with light. We may, however, give up the spray without abandoning the principle of Listerism, or the most important details of the practice. So far as the operation itself is concerned, independent of its giving access to microbes or their spores, I do not see that Listerism can have much influence. It does not render the manipulation either more or less difficult, nor does it in any way diminish the chance of the accidents common to all capital operations. But with regard to septicæmia, even though we cannot proportion the effect of the coincident causes, the diminution which I have recorded as having taken place in my last 7 years' experience is a most happy result.

Much may be due to antiseptic dressings, and to the persistent diffusion of an antiseptic atmosphere; but it must be remembered that, at the same time, my patients since 1878 have all had not only the advantages belonging to a position in life above that of hospital cases, but they have been exempt from the risks of the possible importation of hospital contagion. The abandonment of the clamp, and the use of the ligature with the intra-peritoneal treatment of the pedicle, took place at the same time as the introduction of the antiseptic treatment; and since 1878 I have never put a drainage tube into any peritoneal cavity. Then, too, as an additional security to my patients, I have never made a post-mortem examination, have been free from all but the most casual contact with hospital influences, have never carried about with me the infections picked up in general practice, and having had fewer persons present at my operations, have eliminated a great part of an incalculable source of danger. Still after all, this plague of abdominal surgery is not abolished, and Listerism has not brought me to the point of seeing no deaths from septicæmia. There yet remains a contingent mortality of 4 per cent. from septicæmia which must be got rid of, and carbolic acid does not seem likely to do it. These microbes all have their peculiarities, and perish or flourish under the most unexpected conditions. What we want now to know is, the agent we can employ in surgery which is lethal to the microbe or spore of septicæmia, and not injurious to patient or surgeon. Or can we look to the possibility of protective inoculation with an attenuated virus?

Resuming our survey of the history and progress of ovariotomy since its revival in Great Britain, I must refer to a letter written by Dr. Keith on December 17, 1884, in which he informs me that his number of ovariotomy cases was then 490. Of these 45 died, showing a death rate of 9·11 per cent.

Dr. Keith adds that his son has had 37 ovariotomies with only 1 death; and I most cordially wish him the same increasing success that has rewarded the skill and judgment of his father.

We have now to follow the advance of the operation in France, Belgium, Germany, Russia, Italy, and Spain, and in America and our colonies, although any such review must necessarily be brief and imperfect.

In France, ovariotomy made but tardy progress. Nor was this to be wondered at, when we find a man like Velpeau opposing it in 1847; and that, notwithstanding Cazeaux's spirited and energetic advocacy, the Académie de Médicine condemned it in 1856. A paper by Dr. Worms, in 1860, had however a better result. Dr. Worms's paper was founded upon an examination of some of my own early cases. He took the precaution of writing to the medical attendants of the patients, in order to ascertain their condition from the time of operation up to the date of his paper, and this able advocacy attracted very general attention in France. Perhaps its most important effect was to induce M. Nélaton to visit England for the purpose of witnessing the operation, and studying its details. He was here in 1862, and witnessed several operations. He assisted me at one very complicated case, which terminated successfully, and was much interested in another where tetanus proved fatal. On his return to Paris, he operated himself, and published a classical clinical lecture, from which may be dated the revival of ovariotomy

in France. Kœberlé, of Strasburg, performed his first operation in 1862, which was also the date of Nélaton's first operation. It had certainly been performed in France before Nélaton's visit to England. The first case was in 1844, by a country surgeon, Dr. Woyerkowski, of Quingez. This case may be looked upon rather as an accidental than an intentional ovariotomy. The next case was in 1847, when another country surgeon, M. Vaullegeard, of Condé-sur-Noireau, operated successfully. Since 1862, the example of Nélaton in Paris, and the influence of Boinet, followed by the many successful operations of Péan, have done much for the operation of ovariotomy in France; but the larger experience of Kœberlé, of Strasburg, has probably had even a still greater effect.

Eustache, of Lille, reports Kœberlé to have had more than 320 operations early in 1881. Péan sent me his report up to the month of October 1881. His gastrotomies then amounted to 449; 306 of these were for the removal of ovarian cysts, with 245 recoveries and 61 deaths. But it has been the same with Péan as with most other surgeons. His latest work is his best, for out of the last 100 ovariotomies there have been only 14 bad results; and curiously enough, exactly 7 in each of the last two fifties.

I believe I was the first to perform ovariotomy in Belgium, in July 1865, in the chief hospital at Brussels, upon a patient of Dr. De Roubaix. It was hoped the example would soon be followed in Belgium; but the patient died from influences almost inseparable from a large general hospital. This unsuccessful result probably retarded for a time the progress of ovariotomy in Belgium. The first successful case in that country was by a pupil of my own, Dr. Boddaert, of Ghent. I had a successful case in Ghent in 1871, and Dr. Boddaert had 2 successful cases in 1872. These 4 cases, I am informed, were the only instances of success out of about 20 operations in that country up to that time. Dr. Boddaert assures me that it would be impossible to obtain accurate statistics for Belgium, as many cases remain unpublished. His personal experience, however, to the end of 1884 amounts to 21 cases with 12 recoveries and 9 deaths before antiseptics; 71 cases since antiseptics, with 64 recoveries and only 7 deaths. Besides these, there were 4 cases of cysts of the broad ligament, 3 of which recovered, 1 dying. This makes Dr. Boddaert's total to be 96 cases, 79 recoveries and 17 deaths.

I led the way to the practice of ovariotomy in Switzerland by operating at Zürich in July 1864, on a lady who recovered perfectly well and has enjoyed good health up to the present time. Up to 1882 I had accounts of 231 cases, the recent cases having been treated according to Lister's system. The results were 177 recoveries and 54 deaths, a mortality of 23·3 per cent. One of the fatal cases was most deplorable, as showing that, in spite of the most exact precautions, the life of a patient and the reputation of an operator are at the mercy of thoughtless, if not culpable, imprudence. According to custom, the sponges were counted before, and were counted again after, the operation. They were fixed in number, and not one was wanting. But a sponge was left in the abdomen, and the sister accused an assistant of having torn a sponge in two during the operation. A similar folly was just stopped in time here not long ago, proving that the sponges should not only be counted but identified.

In Germany, in 1819 and 1820 operations by Chrysmar, and in 1820 by Dzondi, only served to bring the operation into discredit. Dieffenbach, who had long condemned the operation, operated in 1826. Martini, Ritter, and others followed Dieffenbach's example, but with so little success that for several years the operation ceased to be practised. In 1866 my volume on 'Diseases of the Ovaries' was translated into German by Küchenmeister. Billroth, who had assisted me, and who had carefully studied the whole subject, began to use his great influence with his countrymen to promote the acceptance of the operation. Nussbaum, of Munich, came twice to England, assisted me several times. and has performed ovariotomy more frequently than any other German surgeon except Schroeder; and Spiegelberg entered upon a long career of successful operations. Grenser, of Dresden, made known the results of a long visit to England in an able review of what he saw here; and ovariotomy is now generally practised in Germany with great success.

Billroth, writing in November 1871, says: 'Up to the present time, I am tolerably contented with my results. I have personally no reason for supposing that the results will be less cheering in Vienna than they are in London.

Up to the beginning of 1877 Olshausen tabulated 613 cases by German operators of completed ovariotomy, with 353 recoveries, or 43 per cent. of deaths and 57 per cent. of recoveries.

Recently the results obtained by Schroeder, Nussbaum, Olshausen, Esmarch, and many other German surgeons are, to say the least, equal to those announced in any other country.

Professor Schroeder, of Berlin, writing to me on November 30, 1884, says that up to that date he had performed 514 ovariotomies, and that the results in successive series of 100 cases were as follows:

1st hundred	17	deaths
2nd „	18	„
3rd „	7	„
4th „	16	„
5th „	7	„
500	65	

Mortality, 13 per cent.

Professor Nussbaum, of Munich, writing to me November 1884, gives the total number of his ovariotomies as 415. Of the first 100, 37 died; of the second 100, 26; of the third, 16; and of the last 115 cases there were 10 deaths. He adds, that of the 89 deaths, 44 were from septicæmia. His youngest patient was 17. and his oldest 75. This old lady recovered.

Professor Olshausen, of Halle, writing on December 26, 1884, says that he has performed 270 ovariotomies. Of these 28 died. Of the first 170, 24 died, or 14·1 per cent. Of the last 100, only 4 died. Of the 28 deaths, 13 were from septicæmia and peritonitis, 6 shock, 2 exhaustion, 2 pulmonary embolism, 2 tetanus, 2 obstructed intestines, and 1 amyloid kidneys. Six of the operations were done upon women during pregnancy, and all the patients recovered. In the last 60 operations the pedicle was almost always secured by elastic ligature, which he left on the pedicle.

Professor Billroth, of Vienna, sends me the following report of his ovariotomies from 1865 to end of December 1884:

Operations arranged in series according to the difficulties	Number	Died	Mortality per cent.
I. None or very slight adhesions of omentum . .	91	9	9·5
II. Extensive adhesions to anterior abdominal wall	130	33	25·4
III. Extensive adhesions deep in the pelvis, or with mesentery, intestine, bladder, uterus, &c. .	95	53	55·7
IV. Suppurating or putrefying cysts—fever patients	8	6	77·7
Total number . .	327	101	31·5
Treatment of pedicle:			
1. Extra-peritoneal, with clamp	79	25	31·6
2. Intra-peritoneal . .	248	76	30·6
Ovariotomies before the use of boiled carbolised silk . .	76	31	40 8
Ovariotomies after the use of carbolised silk . . .	251	70	27·8
Of those with spray . . .	71	29	40·8
„ without spray . .	180	41	22·7

Billroth, writing to me in 1881, made the following interesting remarks: 'I must explain that only within the last 3 years have I begun, in cases really too difficult, to close the abdominal incision and leave the operation incomplete. Up till 3 years ago I finished at any cost every operation that I began, and this naturally made the statistics worse. In the last 3 years I have closed the wound in 12 cases, and not one of the patients has died in consequence of the incision. I attach very little importance to figures in relation to a method of operating. My opinion is as follows. Granted that the operation is well done, and that the patient does not die within about 24 hours from loss of blood or shock (which has occurred to me only 4 times in 222 cases), the result depends upon whether *sponges*, *fingers*, *instruments*, *secretions*, and ABOVE ALL the *ligature threads*, are *clean*. If this be so, all get well. Three weeks ago I operated on a carcinoma of the ovary which had grown through small intestine and the bladder. I cut away 8 centimetres of small intestine, completed the enteroraphie; then I cut away the upper part of the bladder and united it with 20 sutures. The recovery was as free from fever as in the simplest case, and the patient was discharged cured after 20 days.'

In the north of Europe, Dr. Sköldberg, of Stockholm, deserves the credit of promulgating, by his example and writings, the knowledge of the operation in Sweden. Before his death in 1872, he had performed

30 operations, with a result of 26 recoveries and 4 deaths. This success naturally had a great influence in Sweden; and Dr. Howitz, of Copenhagen, and Professor Nicolaysen, of Christiania, who both assisted me many times, have done good service with their Danish and Norwegian countrymen. Writing December 26, 1884, Professor Nicolaysen, of Christiania, says that he has done 109 ovariotomies, about two-thirds of all in Norway, which altogether amount to 166 cases, with 61 deaths, a mortality of 36·7. Of Professor Nicolaysen's 109 cases, there were 35 deaths. But since 1878, when he began to apply full Listerism, the result of 74 cases has been 57 recoveries and 17 deaths, a mortality of 23 per cent.

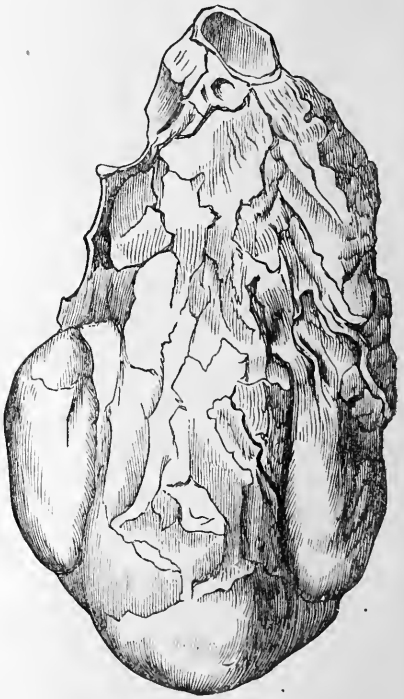
In connection with the practice in Christiania, Professor Nicolaysen makes remarks to this effect: That the great mortality among the early cases was principally due to the delay in seeking relief by operation, as most of the patients had been subjected to long-continued medical treatment leading only to anæmia, adhesions, and all the complications of old cases. This has been in a measure changed of late years, and the operations have taken place at an earlier stage of the disease. At the same time antiseptic precautions have been adopted, the carbolic spray and dressing being used. Professor Nicolaysen adds that, 'after having used sulphurous acid for cleansing the sponges, there has been a remarkable reduction in the mortality.'

In Russia, the first ovariotomy was performed at Charkoff by Professor Vanzetti in 1846, and the second at Helsingfors in 1849, by Professor Haartmann. Both cases were unsuccessful. The first successful case was performed by Professor Krassowski, of St. Petersburg, in December 1862, and his results were afterwards so satisfactory that, in 1868, he published the well-known atlas of beautifully coloured plates. His example has been followed by many Russian surgeons. In 1882 there had been 302 ovariotomies reported by 40 native surgeons in St. Petersburg and the various provinces of Russia. No account is published of many of the ovariotomies done in Russia, and the number is really much greater. All but one of the ovarian cases which have come to me from Russia recovered from the operation.

In Italy the first successful ovariotomy was performed by Professor Landi, of Pisa, in September 1868; the second, by Professor Peruzzi, of Lugo, in 1869; the third, by Dr. Marzolo, of Padua, in July 1871.

Each succeeding year brings from Italy news of greater numbers of operations and of better results.

In the first 100 cases performed in Italy, Peruzzi proved that the recoveries were 37 and the deaths 63, while in the second 100 these figures were rather more than reversed, the recoveries being 64 and the deaths only 36. In the third 100 there were 26 deaths, in the fourth 21; but in the fifth, completed in June 1884, the deaths were 23; and while 18 years were required to complete the first 100 (1859–77), the fifth 100 was completed in 13 months.



It has sometimes been said that the first ovariotomy in Europe was done by Emiliani, of Faenza, in 1815. It so happened that the tumour he removed was preserved in the museum at Bologna, and in 1878 I arranged with Dr. Peruzzi that it should be examined by Professor Ranvier. Ranvier wrote with extreme caution, but reported that in all his sections he only observed fibrous tissue without any trace of glandular structure.

The exact size and form of this tumour

are well represented in the woodcut on the previous page.

I do not think this case can be cited as a case of ovariotomy in the sense in which this operation has been regarded, from its first performance by McDowell to the present time. Emiliani, no doubt, believed he had removed a 'scirrhous ovary,' and it is certain that he removed a fibrous tumour which is much more like a uterine than an ovarian tumour. The removal of such a tumour, however, could have no more bearing upon the rise of ovariotomy than the removal of a hernial ovary from the inguinal canal.

It is not easy to obtain information as to the number and result of cases of ovariotomy in Spain and Portugal, but there is reason to believe that they are neither so numerous nor so successful as in Italy.

In India, as early as 1860, ovariotomy was performed successfully at Tanjore by a native surgeon. In Australia many operators have emulated their English brethren. In New Zealand, Dr. Mackinnon was the pioneer of ovariotomy at our antipodes. In Canada, the few cases which have been published have been almost all successful; and there is already abundant evidence that ovariotomy may be practised successfully under the most different conditions and in the most opposite climates. One case was reported from Japan in 1880.

It is impossible to give anything like a full historical sketch of the progress of ovariotomy in America within any reasonable limits. The initiatory work of McDowell has been already described. Atlee stood next to myself in the number of operations he performed. Kimball of Lowell, Peaslee, Marion Sims, Storer, and many other American surgeons have maintained the reputation of their country in this department of surgery. Works by Atlee and Peaslee were published in 1872, and their European brethren read with great interest their account of their own work and that of their countrymen.

In a work by Agnew, there is a table compiled by Baum of 5,153 cases of ovariotomy, of which 3,651 recovered and 1,502 died = 29·13 mortality per cent. Of these there were:

	Cases	Recovered	Died	Mortality per cent.
Single	4,969	3,531	1,438	28 94
Double	183	120	63	34·42
During pregnancy	21	17	4	19·05
Twice on same patient . . .	15	12	3	20·00

But this table includes cases both of American and European surgeons.

CHAPTER V

THE CONDITIONS AFFECTING THE OPERATION OF OVARIOTOMY

I MAY refer students interested in the statistics of ovarian disease in England to the 6th chapter of my work published in 1882.

The cases which come under the hands of the surgeon fall into two groups; patients who, with symptoms calling for immediate action, ought to be given the chance of a preliminary tapping; and others who must without hesitation be advised to submit to the more severe ordeal of ovariotomy.

A woman with a single unilocular cyst may suffer to such a degree from rapid accumulation of fluid and distension that she must be saved by some means from the effect of mechanical pressure. Once assured that the cyst really is single, tapping may be tried; and in my opinion it should be enforced by almost a refusal to do ovariotomy until it had been tested. But this advice as to tapping, and especially as to renewed tapping, as a means of cure must be restricted absolutely, as I have before stated, to cases in which the cyst is single and the contents clear and non-albuminous. In all cases of multilocular cysts or dermoid tumours, where the abdominal distension is sufficient to injure the general health or cause local suffering, there must be no faltering, no suggestion of alternatives or delay. Justice to the patient demands a positive recommendation of excision, and generally it should be accompanied by a warning against the danger of delay. Everyone

who takes upon himself the responsibility of such counsel should have a clear idea of the base upon which it rests. And it may be traced out summarily in this form. The health has already deteriorated, and though the tumour itself be neither malignant, nor inflamed, nor suppurating, nor the seat of hæmorrhage, yet its mere presence is the cause of the patient's decline. To let things go from bad to worse without doing anything, especially as that worse is a certainty, would be acting against the very first principles of medical science. The presence of this morbid growth in the body may give rise to other diseases. It attaches itself oftentimes to the intestines, mechanically blocks the passage through them, or causes fatal contractions, and, at the very least, impairs their functions and hinders the due assimilation of food. Its continuance allows time for the balance of the action of the heart and lungs to be deranged, and for structural changes to take place, which if not immediately fatal or sufficient to mar the operation, may render recovery of health after ovariotomy slow or incomplete.

As time advances, the natural tendency of the tumour to degenerative changes finds scope for progress. Whatever its tissues may be, they are never lastingly normal, have a precarious parasitic existence, gain their supply of blood as it were surreptitiously, and are easily thrown into the condition of atrophic decay. The expansion of the membranous compartments obliterates the vessels, fatty and other changes occur, and rupture is always imminent. The contents too, whatever they may have been at first, alter in their character and become less and less benign. And by too long waiting, sympathetic morbid action may be set up in the corresponding organ, and thus make the ablation of both imperative.

Time, too, gives the opportunity for adhesions to form, for rupture or destructive peritonitis to occur. With some tumours growing on a long pedicle twisting may cause hæmorrhage or gangrene The contingency of conception and pregnancy is an avoidable complication. Still it is no less to be thought of and made the subject of warning.

In many cases ovariotomy may be performed with a confident hope of a successful result; in others the probabilities of success or failure may be about equal, while in some the hope of success is so small, that most patients, who are told the whole truth, prefer waiting for the natural termination of the disease to voluntarily placing their lives in immediate peril. Some, however, would urge the unwilling surgeon to operate against his better judgment, and I have often yielded to the solicitations of patients who, their sufferings being great and death being inevitable at no distant period, have preferred running any risk rather than submit to a continuation of suffering. In only one case have I refused to operate when pressed to do so by a patient capable of appreciating the difficulties of the position. In this case, a woman in the Samaritan Hospital suffered, as I believed, from malignant disease, involving the uterus and both ovaries, and had a large quantity of fluid free in the peritoneal cavity. I removed this fluid, but refused to do more, although the woman threatened to commit suicide if I did not operate. After her death, the correctness of the diagnosis was fully borne out. I have heard of some few cases where patients whom I had dissuaded from the operation have been encouraged by others to submit to it; and, with one exception, every such patient has died after the operation. The exceptional case was a woman who had been several times tapped, and who had been advised both by Dr. Keith and by me not to think of ovariotomy so long as life could be made tolerable by tappings. Fifteen months after I saw her, the tumour was removed by Dr. Graham, of Liverpool, who encountered and overcame the pelvic and other adhesions which both Dr. Keith and I had recognised, and obtained the satisfaction of saving a life otherwise inevitably lost. I have thought it necessary to make this statement distinctly, because it has been supposed that ovariotomy has been restricted to favourable cases only, and that good results had been obtained by refusing to operate upon any but selected cases. Indeed, this was known to be the case in the early days of ovariotomy in this country.

Before going into the numerical examination of the question as to how far the age and condition of the patient, the size of the tumour, the existence of adhesions, the length of the pedicle, have affected the result in my whole practice, I think we may conclude that this experience has now been sufficient to warrant the

acceptance of some such rule as the following:

The probable result of ovariotomy can be estimated with far greater accuracy by a knowledge of the general condition of the patient than by the size and condition of the tumour.

In other words, a large tumour, extensively adherent, in a patient whose heart and lungs, and digestive and eliminative organs, are healthy, and whose mind is well regulated, may be removed with a far greater probability of success than a small unattached cyst from a patient who is anæmic or leukæmic, whose heart is feeble, whose assimilation and elimination are imperfect, or whose mind is too readily acted upon by either exciting or depressing causes. I believe this to be the explanation of the facts which have led some superficial observers to assert that the more advanced the disease the greater, and the earlier the stage of the disease the less, is the probability of recovery. I am convinced that this reasoning is based on the observation of a few exceptional cases where small unattached tumours have been removed with a fatal result from unhealthy or infected persons; or where large attached tumours have been successfully removed from persons who have otherwise been constitutionally sound. Small unattached tumours in strong healthy persons have by no means given the best results. It is possible to operate too early as well as too late—to place a patient's life in peril by operation before it is endangered by the disease; just as it is possible, on the other hand, to delay operation until the powers of life are so exhausted that recovery after a severe operation is impossible. A strong man in full health, with a limb crushed by a railway accident or shattered by a bullet, bears amputation worse than another man who, on account of diseased knee-joint, has been confined to his room for weeks or months. So a woman who has become accustomed to the confinement of a sick-room, has lost flesh, and has been brought by her suffering to dread the operation less than the disease, bears the removal of an ovarian tumour, even though large and adherent, better than one whose whole course of life is suddenly changed from the performance of ordinary active duties to the enforced quiet and confinement in bed which necessarily follow ovariotomy.

SIZE

The *size* of an ovarian tumour has not, by itself, appeared to affect the result; but size and solidity together, by affecting the length of the incision necessary for the removal, appear to be of some importance. If there be but little solid or semi-solid substance present —which is generally easily discovered before operation—large adherent cysts holding 50, 60, or 70 pounds of fluid may be removed, after the contents of the cyst have been evacuated, through an opening only just large enough to admit one of the operator's hands. The result of such cases has been satisfactory; but the mortality has been greater when longer incisions have been necessary. The number of inches is a very imperfect mode of judging of the length of incision. In a small woman with a tumour of moderate size, an incision of 8 or 10 inches would extend almost from sternum to pubes; while in a large woman, greatly distended by a large cyst, an incision of this length may be made below the umbilicus, and after the contraction of the abdominal wall, the cicatrix may not be more than 3 or 4 inches long. In examining a case for operation, it becomes important to judge whether a cyst or tumour can be removed by an incision which does not extend above the umbilicus. If this can be done, the probability of success is much greater than when it becomes necessary to extend the incision far above the umbilicus.

ADHESIONS

Writing in 1872, I reported that in 296 cases out of the first 500 there were no adhesions, or they were so slight as to be almost unnoticed. Of these patients 237 recovered and 59 died, the mortality being 19·93 per cent. In 204 cases, adhesions were very extensive: of these patients 136 recovered and 68 died—a mortality of 33·33 per cent. This would show that the mortality of cases where there are considerable adhesions is about 13 per cent. greater than in cases where there are no, or only trifling, adhesions. But a more careful examination of each case appears to confirm the conclusion at which I arrived some years ago, that adhesions to the abdominal wall, or omentum only, have but little influence

upon the mortality, and that the importance which has been attached to the diagnosis of adhesions before operation has been greatly and unnecessarily exaggerated. At the same time the diagnosis of adhesions within the pelvis is of very great importance, as the attachments to the bladder or rectum may be almost inseparable without great and immediate danger to life. The same may be said of attachments to the liver, stomach, spleen, or around the brim of the pelvis, the separation of which would endanger the iliac vessels or the ureters. I formerly believed that the closeness of the connection between the uterus and the ovarian tumour—in other words, the length of the pedicle—was a grave matter, as upon its extent depended the possibility of keeping the end of the secured pedicle outside the peritoneal cavity, or the necessity for leaving it within this cavity. But during the last 5 years, having quite abandoned the extra-peritoneal treatment of the pedicle, a short pedicle, or close connection between cyst and uterus, becomes important in leading to greater difficulty in securing bleeding vessels. But it also leads to the advisability of uniting the peritoneal edges of the divided pedicle, or separated tumour, by suture, in order to avoid dangers which will be pointed out in the chapter on the operation. Some of these remarks, written in 1872, were intended to convey the result of an impression made by a general survey of the 1st 500 cases reported, and by reminiscences of what happened at and after the operations. But the information obtained from a more exact investigation of the 2nd 500 cases, and embodied in the accompanying table, does not correspond with that impression:

TABLE SHOWING THE EFFECT OF ADHESIONS UPON THE RESULTS OF OPERATIONS IN THE 2ND 500 CASES OF OVARIOTOMY

Adhesions	Cases	Recoveries	Deaths	Mortality per cent.
None	212	183	29	13·67
Parietal	61	50	11	18
Parietal and omental .	63	51	12	19
Omental	62	47	15	24·19
Intestinal, pelvic & others	102	64	38	37·25
	500	395	105	21

The general mortality after the operation is seen to have been reduced from 25·4 to 21 per cent.; while the large increase in the mortality among the bad cases of visceral adhesion is noticeable. This may be accounted for by the greater boldness with which excisions were latterly undertaken and carried to completion. Many of the later operations finished, would formerly have been refused as hopeless, or abandoned after the first incision, and added to the tables of incomplete cases or exploratory incisions. But with regard to what have been spoken of as 'slight' adhesions—that is, adhesions to the parietes and to the fringes of the omentum—the table presents us with a mortality of 5 per cent. in excess of that of the simple cases; while the deaths after separation of omental adhesions are double, or nearly so, those among the free cyst operations, the relative percentages being 13·67 for the non-adhesions and 24·19 for the omental adhesions.

Now, when we take into account that, according to my experience, nearly three-fifths of the cases operated on have adhesions of some kind, and that the mortality of the group of adhesion cases, as a whole, was double that of the simple cases—26·38 to 13·67—it gives a serious aspect to the general question of adhesions. The death-rate of 37·25 in bad cases of visceral adhesion, found in one-fifth of the total number, at a time when the general mortality after my operations was rapidly coming down to 10 per cent., speaks for itself as to the gravity of the prognosis in such cases. And the other fact shown by this investigation of my 2nd 500 cases, that even with the so-called trifling adhesions—that is, cases in which the adhesions were only parietal or partially omental—the deaths were nearly one-half more (18·54) than in the free cyst cases, and that among the adhesions classed as omental the mortality was nearly double (24·19), corrects the impression that adhesions of this kind were not of much importance. Their existence should not deter from the operation, nor make anyone falter. But these facts mark more strongly than ever the importance of avoiding everything in the early stages of the disease which may produce adhesions, of not letting the time for operating go by when the cyst is free, and of giving a proportionally guarded prognosis as to the probable result of operation when extensive adhesions are known to be present.

AGE

The average age of 1,000 cases of completed ovariotomy proves to be as near as possible 39 years.

The small mortality shown in my reports of operations upon persons under the age of 25 and between 60 and 70 is remarkable when compared with that of the intermediate ages—40 to 45 excepted. The 127 young people under 25 years of age went through the operation with a mortality of 12·59 per cent.; the 45 between 60 and 70 escaped with a loss of 17·77 per cent.; while those between 25 and 60 died at the rate of 26·41 per cent. From these I omit 118 of from 40 to 45, who were fortunate enough to have a death-rate of only 16·94 per cent. One of the two cases over 70 died. I have not been able to make out what were the influences acting so favourably upon the 40–45 cases. That it was not a mere accident would appear from the fact that the immunity at that age was not confined to any part of the series, but was about equal in the two five hundreds.

MORTALITY AT DIFFERENT AGES

In reference to this subject Dr. Ogle wrote to me thus: 'Among the 3,414 deaths ascribed in the 10 years, 1871–80, either to ovarian dropsy or to ovariotomy, were 2 of girls under 15 years of age, and 7 of women over 85 years of age. The greatest absolute number occurred between the ages of 45 and 55, and next to this came the decennia on either side of this period of life.' But taking into account the different numbers of women living at each period, Dr. Ogle adds: 'It appears that the time of life when this disease is most fatal—that is, causes most deaths in proportion to the number living—is from 55 to 65, and the next fatal periods are the decennia on either side of this.'

CONJUGAL CONDITION

The mortality was nearly equal among married and unmarried women at all ages, in 1,000 patients.

SOCIAL CONDITION

The results of operations in hospital and private practice are affected by many other causes besides the social condition of the patients.

Under favourable circumstances the rate of death has been so nearly equal in all classes of patients that it overturns the belief formerly entertained by some writers, that deaths have been chiefly among poor women, and that this is not accidental. My experience certainly does not support the conclusion that 'the social position of the patient has a good deal to do with the result.' My hospital patients were poor, though few could actually be ranked as paupers.

Many of the private operations have been performed in the houses now common in London, where it is intended that a patient shall obtain the conjoint advantages of an hospital and of home or private apartments. There can be no doubt of the advantages of such houses, provided the management is good. But they must always be open to the objection of subjecting one patient, more or less, to the influence of others in adjoining rooms or in the same house. I am convinced that some of the deaths, both in hospital and in the nursing establishments, have been due to the injurious influence of other patients upon the subject of the operation; an influence which would not have been felt in a private house. Apart from all question of infection, my belief is that, in the one case, if any important peritonitis follow the operation, the inflammation is almost always local, not attended by much effusion of serum, nor by elevation of temperature or other signs of fever or blood-poisoning; whereas, under the influence of other patients in the same house the inflammation is diffused, is accompanied by the rapid effusion of a considerable amount of fluid, with great elevation of temperature and other indications of septicæmia. I am becoming more and more doubtful if we ever see this latter chain of symptoms, either in hospital or in healthy houses, if the patients are kept quite free from the access, by contagion or infection, of the poisonous material—solid, liquid, or gaseous—which acts as certainly as an inoculated particle of small-pox or vaccine virus, or as the inspiration of an infective atmosphere in scarlatina, and from which the patient is absolutely safe in the absence of the poison.

INFLUENCE OF SEASON

The general result of my experience is that seasons, as expressed by winter, spring, summer, or autumn—or that hot

or cold months, or any particular month—have little or no influence upon the result of ovariotomy; and with regard to any exceptional atmospheric or climatic conditions, all we can say is that this is a case for 'Collective Investigation,' that the combined action of many observers in every variety of social, territorial, climatic, and professional conditions, extending over adequate time and numbers, must be brought to bear upon the subject before we can formulate the laws which determine the results of season upon our operations.

CONTRA-INDICATIONS

As a general rule, any existing disease which in its natural course would prove fatal to the patient, or would influence her constitution in such a manner as to render her recovery very unlikely, or other serious surgical operations inadmissible, should also forbid ovariotomy. It ought not to be resorted to in individuals suffering from cancer, far-advanced tuberculosis or scrofula, syphilis, important diseases of the heart, or in cases where this organ has been displaced by the tumour, and at the same time has been fixed in its abnormal site by adhesions which would retain it in its position even after the removal of the ovary; diseases of the brain and of the nervous centres, of the liver, spleen, and kidneys; ulcers of the stomach and diseases of the alimentary canal, which permanently impair general nutrition; ascites in consequence of liver complaint, of disease of the heart, or degeneration of the kidneys. The mere presence of albumen in the urine has often had undue weight. It is often of no more importance than in pregnancy, and disappears after the pressure of the tumour ceases. Scurvy, anæmia, and other blood diseases, hectic fever, great weakness and extreme emaciation from advanced age or impaired nutrition, would lead, if not to absolute prohibition, to a very unfavourable opinion as to the probable result.

But scarcely ever will the judgment of the surgeon be so severely tested as in estimating the value and importance of many of the above-mentioned contra-indications, whether any one is by itself so serious as to preclude surgical interference, or is merely a consequence of the local disease. This may be instanced by one of my cases where all the symptoms of far-advanced tuberculosis were present—cough, hectic fever, high temperature, and rapid pulse—which all disappeared after extirpation of the ovarian tumour. The pulse fell from 108 to 88, the temperature from 101·4° F. to its normal range; cough was no longer troublesome. It may be added that the cyst contained genuine tubercular deposits, was thin-walled, and very fragile.

The operation ought not to be performed when the tumour is in an advanced stage of cancerous degeneration. But so many instances of recovery after extirpation of what was pronounced to be cancer are well known, that there must be more than bare suspicion to set aside the operation. Cancer of the ovaries is supposed to occur most frequently after the change of life; but cases have been mentioned, in another chapter, of this disease in a young girl, and in middle-aged women. Such tumours often form extensive and intimate adhesions, taint the surrounding tissues, and attack the neighbouring organs, with which they form at an advanced stage of the degeneration one confluent mass. In most cases, their extirpation, if attempted, would meet with insurmountable difficulties; and should the operation be terminated and the patient recover from it, the disease would sooner or later attack some other part or organ. Ascites generally accompanies malignant disease of the ovaries, and both ovaries are usually affected at the same time.

The presence of ascites need not deter from the operation, provided it be due to escape of fluid from the cyst, or is brought on by the mechanical irritation of the peritoneum by the tumour. If, however, it is caused by disease of heart, liver, or kidneys, these conditions almost always forbid the operation. The complication of pregnancy with ovarian disease, and its bearing on ovariotomy, are treated of in a subsequent chapter.

CHAPTER VI

PREPARATION OF A PATIENT FOR OVARIOTOMY; DUTIES OF THE NURSE; DESCRIPTION OF NECESSARY INSTRUMENTS

It by no means follows that the state of robust health is one so favourable for operation as that of a patient more or less accustomed to the quiet and habits of a sick-room. And it is perhaps one of the most difficult questions which the surgeon has to determine, whether a patient not yet broken down by the progress of the disease, is suffering enough in general condition to warrant him in recommending an operation necessarily attended with serious risk to life. Every case must be judged by its own peculiarities; not those only which relate to the physical condition of the patient, but the various moral, mental, and social influences which have so constantly to be considered in daily practice, and which so materially affect the results of any operation. For instance, an unmarried girl with ovarian disease is often so distressed by the suspicions which her appearance excites, that she must be relieved earlier than a married woman of the same size needs be; and a girl engaged to be married, and naturally unwilling to marry as an invalid, may claim with good reason earlier aid from surgery than one not so pledged. The same would hold good with a wife wishing to travel with her husband, or to join him in some distant part of the world. On the other hand, there are family circumstances which would properly delay operation till the last possible moment. Children may be dependent on the annuity of the mother, whose life should not be subject to the additional risk of the operation until it is imperatively called for by the severity of her sufferings. In many cases such considerations have guided me in operating either earlier or later than one would do if only obliged to regard what was best for the bodily welfare, and able altogether to ignore the affections, interests, and circumstances of patients.

A condition which certainly requires correction before the operation is undertaken, is that common one where only a small quantity of highly concentrated urine, depositing mixed urates in abundance, is passed. If ovariotomy be performed on a patient in this condition, a serious amount of kidney congestion, with symptoms almost amounting to uræmic fever, is almost certain to follow the operation. Before undertaking it, therefore, it may be necessary to gain time by tapping. Whether or no this may be necessary, warm baths or vapour baths, to promote free cutaneous secretion, something to secure a free daily action of the bowels, and some of the alkaline carbonates, largely diluted, will most likely greatly improve the condition of the patient. Nothing tends so rapidly to clear the urine as lithia. From 5 to 10 grains of the citrate or carbonate of lithia, dissolved in a full proportion of simple or aerated water, 2 or 3 times a day, generally lead to a more abundant secretion of urine which is free from deposit. Sometimes it is a good plan to combine the carbonates of lithia, potash, and soda, and it may be desirable to give iron at the same time. A draught of 5 grains of tartrate of iron, 5 of carbonate of lithia, and 10 each of the bicarbonates of potash and soda, with a few drops of chloric ether, 2 or 3 times a day, has has often appeared to me to be of great service. A course of perchloride of iron before any serious surgical operation is said so to alter the condition of the blood as to make pyæmic fever or septicæmia less liable to occur. A change to the seaside or country will assist the restorative action of medicines; and if the patient is brought from the country it may be well to arrange for the performance of the operation before the influences of town life have had time to prove injurious.

The place where the operation is performed ought to be healthy, and there can be no excuse for putting or leaving the patient in an unhealthy house or district. If she lives in a healthy part of the country and can be treated there, it would be positive cruelty to bring her to an unhealthy part of town, or to expose her to the influences of a large general hospital. Even in the same town, or in the same district of large cities, better results have been obtained in private

houses and in small hospitals, where the patient occupies a room alone, than in large general hospitals. It is well worthy of remark that the periods of good and indifferent results in the Samaritan Hospital have corresponded with improvements in its sanitary condition. After emptying the hospital for a month or more, and thoroughly cleansing, painting, and lime-washing the wards, a period of almost uninterrupted success has followed. Then what was called 'a run of bad luck' set in, clearly attributable to crowding, some neglect in purifying bedding, or to contagion or infection. Another thorough cleansing again led to better results. If we could obtain all the favourable conditions of a room in a private house, in a healthy country situation, there can be no doubt that the mortality would be much smaller than the best results hitherto attained in large towns.

The ward or room, whether in a small hospital or in a private house, should be well provided with means for keeping up a continual and sufficient ventilation, without exposing the patient to currents of cold air, and the temperature should be regulated by an open fire. In a building constructed for the purpose, it would seem to be easy to keep up a constant current of fresh air, at any temperature required, night and day; but what is theoretically easy in warming and ventilating has probably never yet been done well. All unnecessary furniture should be removed from the room, particularly dusty woollen curtains and carpets. Two iron bedsteads should be provided, not more than 3 feet 6 inches wide, so that the patient can be reached equally well from either side, and may be lifted from one bed to the other. A horsehair mattress is cooler and firmer than a feather bed, and therefore preferable, and open iron spring bedsteads are far safer than the old sacking and wool or straw mattress under the horsehair. The covering ought to be light but warm; and no one should be allowed in the room but the patient and her nurse.

The nurse has a very important influence on the result of ovariotomy. Much depends on her regarding all the essential precautions, and managing for the comfort and encouragement of the patient, up to the time of the operation; and the after-treatment can be altogether marred by any failure of discipline, or neglect in fulfilling every little point of the duties entrusted to her. What is especially wanted in a nurse for this kind of work is a calm, quick, decided way of doing it; an intelligent understanding of its nature; a readiness in comprehending the instructions given; punctuality and exactness in carrying them out; and a discriminating carefulness in observing and reporting all that passes under her notice, and that may be of importance to the surgeon in judging of the progress or regulating the treatment of the case. The passive, confiding docility of women after ovariotomy, who find themselves subject to the good understanding which exists between a competent nurse and the surgeon she is serving under, is in marked contrast with the keen anxious watchfulness and feverish fidgetiness of others less fortunate in their attendants, and the progress towards convalescence is promoted or retarded in such a way as to make very clear how much the style of nursing has to do with it.

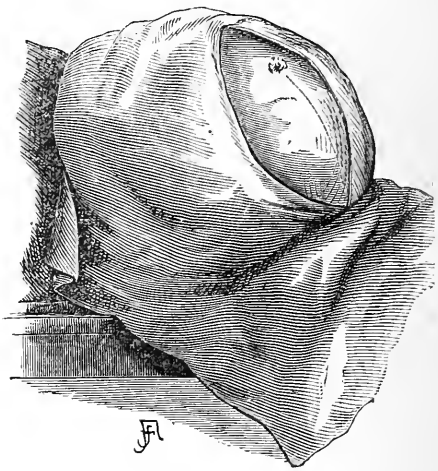
No nurse should be entrusted with the care of a patient after ovariotomy unless she is well able to use the female catheter without uncovering the body and exposing it to chill. She should use the catheter every 6 or 8 hours, or as much oftener as the patient may wish, and should preserve the urine, but not in the sick-room, for the examination of the surgeon. She should also be well practised in clearing the rectum by injections, and expert in giving medicine or food by it when necessary. She should know the danger of bed-sores, and the mode of avoiding them.

Very few nurses can be entrusted with the sponges. The surgeon should always see that they are as pure as they possibly can be made before every operation. The nurse should cut several slips of adhesive plaster, about 2 inches broad, and long enough to more than half encircle the body, and arrange a supply of thymol or iodoform gauze, salicylic wool, and some muslin bags filled with phenolised or boracic cotton-wool, such as those devised by Mr. Gamgee. An india-rubber bag filled with hot water should be ready for use; a flannel belt to pin round the body, and some large safety pins to fasten it. Some brandy, one or two pint bottles of champagne, and some ice, must be entrusted to her care. An enema bottle, holding an ounce, with an elastic tube, a

minim measure, and some laudanum should be provided, so that in case of pain a dose of it may be injected into the rectum. A feeding-cup is also wanted, with which nourishment may be given without the patient rising.

It is better that the temperature of the room should not be so high as was formerly supposed indispensable, nor need any attempt be made to charge the atmosphere with moisture. In my first paper on ovariotomy, I expressed my belief that many of the symptoms, supposed to be caused by the operation, were in reality due to the confinement of the patient in a hot close room filled with watery vapour, and I showed that both patient and surgeon were much more comfortable in an ordinary atmosphere. The temperature of the room should not be below 60° Fahrenheit, but it need not be raised to an uncomfortable degree above this point. The patient should wear her ordinary night-dress, warm woollen stockings, and a loose short flannel dressing-jacket. Anything tight round the neck or body should be removed. Even if the bowels have acted on the morning of the day selected for operation, the rectum should be thoroughly cleared out by an injection of warm water. A little good beef-tea, with dry toast, will be enough for the morning meal, and nothing should be eaten for 4 hours before the anæsthetic is administered. I find about 2 or 3 in the afternoon a better time for operating than an early morning hour. A patient who expects to undergo an operation early in the morning seldom sleeps well, or she awakes wearied and depressed; but if she is to get up and does not expect her fate to be decided till the afternoon, she sleeps better, and there is time for clearing the bowels after breakfast. With a warm bath the night before, the skin is in a better state for perspiring. The abdomen should be thoroughly cleansed with soap and water. It is important that the nurse should be instructed in the use of the clinical registering thermometer, and it is always well to know the morning and evening temperature of a patient for 2 or 3 days before operation.

Tables on which the patient is to lie for the operation, with foot-pans or pails beneath for the reception of the fluid, and another table for the instruments, should be placed opposite a window admitting a good light. The nurse should have a good fire in the room, and a plentiful supply of hot and cold water; and she ought to see that all is in such readiness that, after the patient is in the room, it may not be necessary to send for anything, or to open the door. With some few unusually nervous patients it may be desirable to administer the anæsthetic in another room, or in bed in the same room, before they are placed on the table; but, as a rule, as soon as they have emptied the bladder, patients may walk to the table and arrange themselves upon it, with some little assistance, in the position desired by the surgeon. The night-gown should be pressed up towards the shoulders. In order to have as few assistants as possible, a broad strap should be carried over the patient's knees, and around the table, and



tightly fastened. Each hand should also be securely fixed by a bandage to a leg of the table. The head should be laid in a comfortable position on pillows; and, except the abdomen and face, the body should be covered with warm light blankets or flannel. The abdomen should be covered by a waterproof sheet, with an opening about 8 inches long and 6 inches wide in the middle; the inner surface spread with a coating of adhesive plaster of about an inch in width all round the opening, so that it may adhere to the skin, prevent any exposure of the patient, and keep her body and clothing perfectly dry and clean.

The drawing on the next page shows how I am now in the habit of arranging two tables near a window, with the patient covered upon them; a table for the

instruments being to the right hand of the operator. Steam spray apparatus may be placed upon another table near the feet of the patient to her left—supposing the surgeon uses the spray.

The necessary instruments for a simple case of ovariotomy are few: a scalpel, to divide the abdominal wall; a director, to protect the cyst as this division is completed; a trocar, to empty the cyst; needles and silk, to secure the pedicle and close the wound; with forceps and ligatures, to secure any bleeding vessels. But there is, perhaps, no surgical operation where the surgeon may be so met by difficulties where he least expected them, and it so often happens that instruments are wanted which would not be at hand

if only the instruments required for an ordinary case were taken, that it is a safe rule to take to every case a full supply of instruments, to meet every emergency. Cautery clamps and cauteries for cases where the cautery is applicable, ligatures and needles of different shapes and sizes for cases where neither clamp nor cautery is used, pressure forceps for temporarily holding separated omentum or torn vascular adhesions, and for securing arteries by ligature or torsion, vulsella specially adapted for holding large cysts, a chain and wire écraseur, drainage tubes of glass, vulcanite, or india-rubber, and perchloride of iron should always accompany the surgeon. Only the instruments which the operator thinks likely to be required need to be arranged on the table to his right, the others in reserve should be placed ready for use in a drawer, or on a tray, out of the way, but close at hand. All this having been done, and the table with the instruments covered with a towel, the light subdued, and no other persons present than the operator, the administrator of the anæsthetic, and the nurse, the patient may be brought into the room.

Before proceeding to describe the various steps of the operation, a few lines may be given to the consideration of the anæsthetic, and to an account of the most important instruments which I use.

In all my earlier operations chloroform was the anæsthetic given. Vomiting following the operation, and continuing with the distressing persistency known

as 'chloroform sickness,' was very frequently observed, in some cases led to great danger, and even became a principal cause of fatal results. I tried sulphuric ether; but the quantity necessary, the diffusion of the vapour, the irritating cough it produced, and the difficulty of inducing complete anæsthesia by it, induced me to search for a better anæsthetic. I tried a mixture of chloroform and ether in different proportions, but soon became aware that the patient was at first only affected by the lighter vapour of the ether, and was then subjected to the action of chloroform just as she was least able to bear it. The addition of alcohol to the ether and chloroform made a mixture which appeared to answer better; and I was trying this triple combination when Dr. Richardson brought the bichloride of methylene before the profession.

An impression has prevailed that bichloride of methylene, or chloromethyl, as it may be more conveniently called, is only useful for short operations, and that it cannot be safely administered for more than 1 or 2 minutes. But as my experience would show that this commonly expressed opinion is the very reverse of the truth, it seems to be my duty to make known what I have seen of the use of chloromethyl in general surgery.

The first surgical operation in which chloromethyl was ever used was a case of ovariotomy, which I performed in October 1867. The sleep produced was of the simplest and gentlest character, and the operation, which lasted 35 minutes, was quite painless.

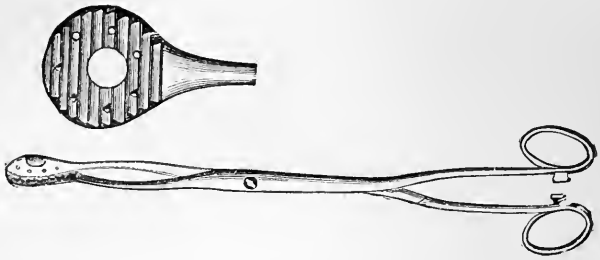
This was my 229th case of ovariotomy. I have now done ovariotomy 1,138 times; and, with the exception of about 10, where, for some reason or other, chloroform was used, chloromethyl was the anæsthetic employed. In some 200 other cases of gastrotomy, and in more than 500 operations of more or less severity—such as herniotomy, amputation of the breast, removal of mammary or other tumours, or of hæmorrhoids, and plastic operations for the cure of vaginal fistula or ruptured perineum—chloromethyl has been administered. In very few of these operations was the condition of insensibility to pain maintained for less than 5 minutes. In a few, it was kept up from 45 minutes to an hour or more; and I should think the average would be about 15 minutes. Yet I have never been at all uneasy in any one of these cases, either during the administration of the anæsthetic or from any subsequent ill effects fairly referable to it. Whereas, with chloroform I never felt quite at ease; and, although I never lost a patient during operation, I have three times had to resort to artificial respiration. I have very often seen patients suffer so much from chloroform-vomiting for many hours after operation, that the result has been imperilled. And in a few cases death has been in some measure due to the vomiting. It is quite true that chloromethyl is not quite free from the disadvantage of causing nausea and occasional sickness; but, in my experience, this is almost the rule with chloroform, whereas with chloromethyl it is certainly exceptional. I think after this evidence it must be admitted that the anæsthetic employed is a good one. In some cases less than 2 drachms was used, and very rarely more than 6 drachms. A patient may be kept in a state of perfect unconsciousness throughout a prolonged operation with methylene administered by the apparatus devised by Dr. Junker. The patient does not inhale the undiluted vapour of methylene, but air which seldom contains more than 2 per cent. and never more than 4 per cent. of the vapour. The fluid itself can only be blown into the face piece by a careless administrator. Scarcely any of the vapour escapes into the room; neither the surgeon nor the assistants are affected by it. A patient very seldom becomes pale; she sleeps quietly, awakes quietly, is not often sick, and seldom has much bronchial irritation referable to the chloromethyl. Indeed, she gains all the advantages of complete anæsthesia with fewer drawbacks than by the use of any other anæsthetic I know of.

The trocar used in ovariotomy by all the earlier operators was an ordinary trocar of full size. The instrument, now sufficiently well known and described as my ovariotomy trocar, I have used for several years past, and have been well satisfied with it.

In 1871, Dr. Fitch made the outer tube cutting, and protected it by pushing the inner tube forward. He also lengthened and curved the end of the canula upon which the tube is fixed, enabling us to use an ordinary india-rubber tube, without fear of stopping the current by its bending. Whether my old ovariotomy trocar or the instrument with this modification be used

(as shown in the drawing on page 86), a cyst when punctured, and partly empty, is fixed on to the canula by the spring hooks, so that trocar, ligature, and vulsellum are united in one instrument, and a large cyst may be emptied and withdrawn, without any fear of its contents escaping.

As aids to the hooked trocar in drawing out a cyst, or in holding a cyst which has been opened, while the septa of inner cysts are being broken up and the contents brought out, hooked forceps, or vulsella of different kinds, are often necessary. The best of these instruments is that known as Nélaton's vulsellum. It holds the cyst very securely, does not slip nor tear the cyst. The essential or grasping part of the instrument is shown in the upper drawing.



The clamp which is used for temporary compression of the pedicle when we intend to trust to the cautery for stopping bleeding from the divided vessels, is known as the Cautery Clamp. The instrument was devised by Clay, of Birmingham, to stop bleeding from vessels in the omentum separated from the cyst. It is to him we are indebted for the principle of combining compression and cauterisation in the suppression of hæmorrhage. The cautery clamp not only securely holds the pedicle, but so firmly compresses the portion included within the blades, that alone it would be almost sufficient to control the bleeding; but when the divided edge of the pedicle is seared by the actual cautery, the effect of compression is assisted by the line of eschar at the cauterised part. The blades of the clamp being heated by the cautery, the compressed part of the pedicle is also heated, the blood in its vessels is coagulated, and when the clamp is removed a thin band almost like wash-leather, with the seared edge, becomes a very efficient safeguard against bleeding. Baker Brown was the first to apply it to the pedicle. I and others modified the instrument by making it broader, by adding a guard to prevent slipping of the cautery, and an ivory or talc shield to protect the soft parts from the action of the heated clamp. But Dr. Keith, after many trials of this and other clamps, finds the original instrument of Baker Brown to be the best.

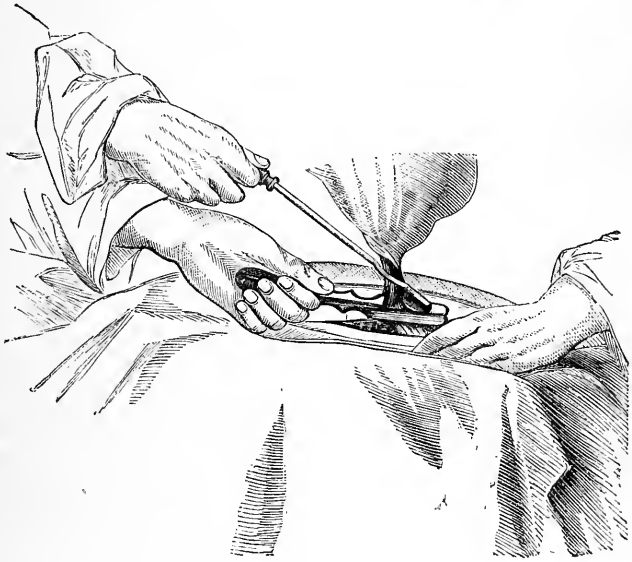
The cauterising irons used by Baker Brown were the ordinary conical irons, with a sharp edge, used in firing joints. With these instruments red hot, he divided the pedicle, as shown in this cut, the tumour being held up by an assistant. This was a tedious and troublesome process; and I found that the same end was attained by cutting away the cyst an inch or two from the clamp, and then burning all the tissue that projected beyond the surface of the clamp. Flat irons answered this purpose better than the conical ones. The galvanic cautery answers equally well, and would be generally preferred, if it were possible always to secure efficient battery action; but as this is uncertain, Paquelin's cautery has been employed. Dr. Keith adheres to the original form of conical iron heated in the fire. I believe it is of very little consequence which of the cauteries is used, provided the clamp exerts sufficient compressing force, and time is taken to cauterise slowly, so that the pedicle is subjected to the somewhat prolonged influence of heat.

The ordinary chain écraseur has been used successfully in dividing the pedicle. I believe I was the first to adopt this practice, but although the case proved successful, I was so fearful of secondary bleeding that I have never repeated the experiment. When the écraseur is used with wire, not to divide the pedicle but simply to secure it in a kind of clamp, a nut and screw allow the handle to be removed.

I have in another chapter alluded to cases which have occurred in my own practice where, long before the operation,

the pedicle had given way from twisting by rotation of the tumour, and the cyst had received its whole blood supply through omental vessels. There can be no question, therefore, as to the feasibility of tearing through a pedicle, or of twisting off an ovarian tumour. Maisonneuve was the first to practise this twisting in ovariotomy; he twisted the cyst round and round until the pedicle gave way. Macleod, of Glasgow, improved upon this practice, and Hilliard, the Glasgow surgical instrument-maker, modified some of the instruments used by veterinary surgeons in castration, in order to hold the pedicle securely with one hand while the cyst is held and twisted with the other. Macleod has had one successful case, and his example has been followed with good results in Leeds. It is possible that there may be cases where this method may be preferable to the ligature or the cautery, but I can say nothing on this point from personal experience.

As bleeding vessels low down in the pelvis may have to be found and secured where, the patient lying opposite the light, the pelvis is in deep shadow, the surgeon should be provided with a hand mirror to reflect light to the bottom of the pelvis. On a clear day this gives quite light enough, but in dark weather, or when operating late in the day, a candle lamp, with a reflecting concave mirror, is service-



able. Collin's lamp is handy, but too small. A policeman's 'bull's-eye,' or a good carriage lamp, is generally to be had, and by the use of accumulators a good reflected electric light may now be obtained.

With regard to the other instruments, it can only be necessary to repeat, that the surgeon should be prepared with scalpels, a probe-pointed bistoury, a broad Key's director, fine strong pure ligature silk, straight needles, forceps, and scissors.

I have for many years used forceps with long handles, which answer all the purposes of 'bull-dogs,' as well as of artery and torsion forceps. The catch at the handles serves to fix the instrument, and the short, roughened points stop bleeding completely, and enable the surgeon to twist the vessel if he wishes.

The forceps of Péan and Kœberlé are either curved or angular. But both have the disadvantage of a space between the blades, which admits of entanglement of one instrument with another, or of the passage of omentum or other structures. This was a fault in my own earlier instruments. It has been completely corrected in the later instruments without at all lessening the compressing power exerted on the vessel.

The handles meet without leaving any opening between them. The rings do not admit the thumb and finger too far; and the end which compresses the vessel is so bevelled, that, if it be desirable to apply

a ligature, the silk will easily slip over the forceps, and not tie the blades together. Thus my instrument is not only useful in forci-pressure and in torsion, but enables the surgeon to dispense with any other kind of artery-forceps if he wish to apply a ligature.

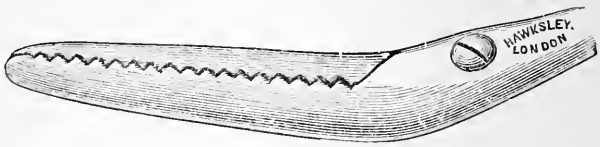
The distal end of the larger forceps which I use for holding the pedicle in ovariotomy, or any mass of tissue in

other operations where the temporary command of bleeding or oozing vessels is urgent, made upon the same principle, is here represented of its ordinary size. The pressure in use is ascertained to be in pounds avoirdupois:

Large forceps—1½ in. fulcrum—object 1 millimetre:

First catch	Second catch	Third catch	Fourth catch
20·10	32·8	47·8	60·0

All the instruments in known numbers are placed on a table near the feet of the



patient and the right hand of the operator, in shallow dishes, filled with a 2 per cent. solution of phenol. The smaller forceps are more conveniently arranged in upright trays, to which they are returned immediately after use. A certain given number being taken and counted before the operation is begun, should also be carefully counted before the abdomen is closed.

CHAPTER VII

THE OPERATION OF OVARIOTOMY

DIVISION OF THE ABDOMINAL WALL; SITUATION AND LENGTH OF INCISION; SEPARATION OF THE CYST; EMPTYING AND REMOVAL; TREATMENT OF THE PEDICLE; SPONGING OF THE PERITONEUM; CLOSURE OF THE WOUND

We shall now suppose that the instruments have all been placed where the surgeon can reach them without moving from his post; that the patient has been placed on the table, secured there by the thigh strap and the wristbands, covered by the adhesive waterproof sheet, and brought under the influence of the anæsthetic. The surgeon, standing on the right side of the patient, with his right hand towards the light, has one assistant on his left hand, and another facing him on the left of the patient. Nurses, with sponges and the necessary articles already enumerated, are also behind and to the left of the patient, while the administrator of the anæsthetic stands at her head, as shown on page 76. All is ready for the first step of the operation, and we have now to consider the situation and length of—

THE INCISION OF THE ABDOMINAL WALL

In all my cases the linea alba has been selected as the seat of incision, and in a very large majority of the cases on record other operators have selected the same situation. In some few cases the incision has been intentionally carried either to the right or left of this line. One of the lineæ semilunares has been occasionally, though very rarely, selected; and in some few cases oblique or transverse incisions have been made. Thus Dr. Atlee in one successful case made an incision 17 inches long, from the symphysis pubis to the middle of the crest of the right ilium. Bühring made an incision at the outer border of the external oblique on the right side from the false ribs to the crest of the ilium.

In one of the earliest cases in England, Mr. King made a vertical incision, 7 or 8 inches long, to the right of the umbilicus, and another 4 inches long at right angles, extending towards the spine. In this case no tumour could be found, and the patient recovered.

Haartmann made an incision, 6 inches long, parallel with Poupart's ligament; and Dorsey a vertical incision 8 inches long met by a transverse incision in the left side 6 inches long. These are the principal examples on record of oblique or transverse incisions. Vertical incisions to one or other side of the linea alba have been less uncommon.

McDowell, in his 1st and 2nd cases, made his incisions 9 inches long, 3 inches from and parallel to the left rectus. In his subsequent cases he seems to have selected the linea alba.

Some writers, as Hamilton, who describes his incision as 'corresponding to the inner margin of the right rectus,' merely express in other words division of the linea alba. The object is to avoid either of the recti muscles. The only operator, so far as I know, who prefers division of one of the muscles, is Storer, of Boston, who says, 'I differ from most operators in that I prefer making the section in the track of a rectus muscle rather than in the linea alba, being thus much more certain, from the nature of the tissue divided, of a primary reunion.'

As I do not believe it possible that a divided and reunited muscle, even when complete union results, can form so firm, unyielding, and perfect a portion of the abdominal wall as the muscle in its normal state—as I do not think that division of the muscle can make union of the skin, peritoneum, or cellular tissue more certain or complete—and as I have never seen want of union when the recti had been carefully avoided, I always endeavour to divide the linea alba accurately, without opening the sheath of either rectus.

It is not often easy to do this, for generally either the weight of the tumour has drawn the recti to one side, or the muscles have been spread out over the surface of the cyst. *Anatomically*, it appears a matter of some importance not to open the sheath; but, although it is well to try to hit the linea alba exactly, it does not appear of much importance *surgically* if one edge of the muscle be exposed, or if a division be made through the muscle parallel with the course of its fibres. If the incision be extended above the umbilicus, it is better to carry it round to the left side, because the round and suspensory ligaments of the liver pass diagonally upwards and backwards attached to the sheath of the right rectus, and might be wounded if the incision were carried either directly through the umbilicus or to the right. In some cases a wound of the ligaments might not be of consequence, but in others it might lead to serious hæmorrhage, as the embryonal umbilical vein is not always entirely obliterated, but remains patent, and is sometimes of considerable size.

When the linea alba is chosen for the incision the following structures are successively divided:

1. The skin.
2. The subcutaneous areolar tissue, with fat of varying thickness.
3. The interlaced fibres of the aponeuroses of the abdominal muscles constituting the linea alba.
4. Layers of the fascia transversalis with more or less fat. The uppermost layer adheres closely to the linea alba. The deepest layer is only very loosely connected with the peritoneum.
5. The peritoneum.

But this normal arrangement is often much modified. When there is much œdema of the abdominal wall the different layers may be widely separated, and appear as if increased in number; or they may be agglutinated together by previous inflammatory processes; and the recti muscles are often carried so much to one side by

the tumour that it is almost impossible to avoid exposure or division of some of their fibres.

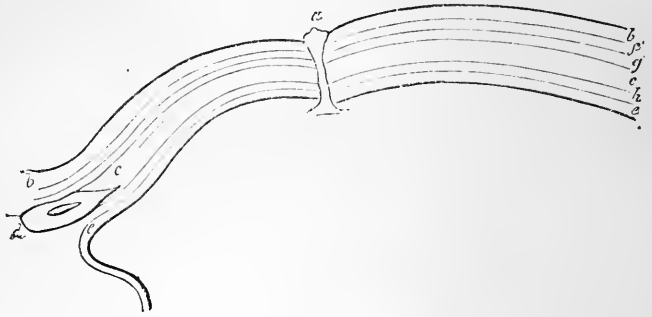
The anatomical question may, perhaps, be studied by the assistance of the accompanying diagrams, which show the structures necessarily divided if the abdominal wall be cut through—

1. Along the linea alba.
2. Through one of the recti muscles, and
3. Along one of the lineæ semilunares.

The effect of division in the upper and lower part of the linea alba is also shown.

Let diagram (No. 1) represent the layers just enumerated as divided, when an incision is made through the anterior abdominal wall at the linea alba.

No. 1.

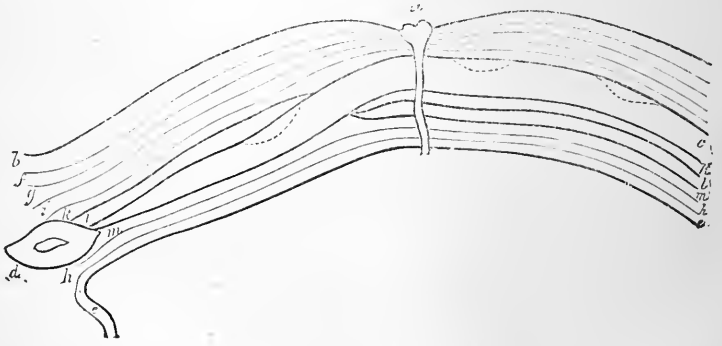


a. Umbilicus.
b. Skin.
c. Linea alba.
d. Symphysis.
e. Peritoneum.
f. Superficial layer of areolar tissue.
g. Deep layer of areolar tissue.
h. Areolar tissue rich in fat, or perimysium internum.

The following diagram (No. 2) will then show how many additional layers must be divided if the incision be carried on either side of the linea alba through one of the recti muscles.

The diagram (No. 3) shows the layers

No. 2.



a. Umbilicus.
b. Skin.
c. The rectus muscle with its inscriptiones tendineæ.
d. Symphysis pubis.
e. Peritoneum.
f. Superficial layer of areolar tissue.
g. Deep layer of areolar tissue.
h. Perimysium internum.
i. Aponeurosis of external obliqne muscle.
k. Aponeurosis of internal oblique muscle.
l. Aponeurosis of transversalis muscle.
m. Fascia transversalis.

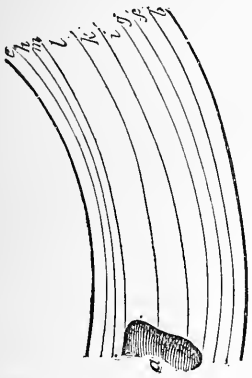
divided if the incision be made along one of the lineæ semilunares.

All of the structures which make up the anterior abdominal wall, and are arranged in the layers represented in the preceding diagrams, are of some interest to the surgeon.

1. *The integument* is thinner and more sensitive between the sternum and the umbilicus than in other regions. Around the umbilicus it is not movable, being firmly connected with the aponeurotic ring by cellular tissue which contains no fat. But when fluid, ovarian or ascitic, is free

in the peritoneal cavity, it often passes through the ring, and distends the integuments into the semblance of an umbilical hernia. Below the umbilicus the integument is very often found œdematous, and any lineæ albicantes present then become very prominent; this condition does not seem to interfere with union of the incision by first intention.

No. 3.



a. Crest of the ilium.
b. Skin.
e. Peritoneum.
f. Superficial layer of areolar tissue.
g. Fascia superficialis.
h. Perimysium internum.
i. Aponeurosis of external oblique muscle.
k. Aponeurosis of internal oblique muscle.
l. Aponeurosis of the transversalis muscle.
m. Fascia transversalis.

2. *The subcutaneous areolar tissue* in some parts of the abdominal wall presents two distinct and separate layers. The superficial layer is rich in fat-cells, and contains the superficial blood-vessels. The deeper layer has more the character of a fibrous fascia, and is the proper fascia superficialis. This separation is most apparent in the hypogastric and inguinal regions, and is more easily demonstrated in old than in young persons. Of the blood-vessels which ramify in the cellular tissue, only the external epigastric artery and vein are of practical interest. The artery, or one of its larger branches, is more likely to be divided when the incision is along one of the lineæ semilunares, or through one of the recti muscles, than when the linea alba is divided. But it can be readily tied before the peritoneum is opened. The external epigastric veins are frequently enlarged or varicose when tumours obstruct the current of blood along the inferior vena cava. In some rare cases a subcutaneous vein communicates through the umbilical ring with the pervious umbilical vein. A slight deviation in the line of incision will often enable the surgeon to avoid enlarged veins; and if this cannot be done, it is advisable to stop, by pressure forceps, the current of blood through the vein before it is divided. In this way, what might be otherwise a serious loss of blood is prevented. It is not often necessary to use a ligature after the forceps are removed.

3. *The sheaths of the recti*, complete anteriorly, incomplete posteriorly from about 2 inches below the umbilicus, formed by the aponeuroses of the flat abdominal muscles, and terminating in the linea alba, hardly require more than a passing mention. But if much disturbed during the first incision, abscess is very likely to delay healing.

4. *The recti and pyramidales* muscles are almost always seen, and one or other may or may not be divided in ovariotomy. When the recti are unusually broad near the pubes, the pyramidales may be absent. When the recti are narrow below, the pyramidales lying in front of the recti, and inclosed in the sheath, are inserted into the inner border of the sheath, half-way between the pubes and the umbilicus, or even higher.

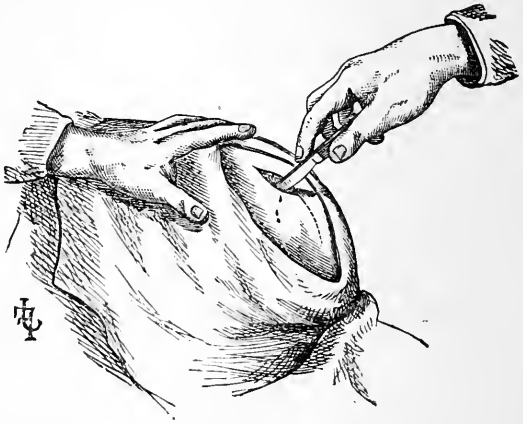
5. The fibres of the flat abdominal muscles cross each other in different directions, embrace the recti muscles, and conjoin on the linea alba, forming a tendinous band, which is very strong at the pubic end, and broader and weaker at the sternal end. The fibres of the aponeurosis on one side continue across the linea alba, and interlace with fibres coming from the opposite side, forming meshes which in the normal state are very small, only giving passage to nerves and vessels; but which, after great distension of the abdominal wall, form apertures through which small masses of fat may escape from beneath, forming what have been called Herniæ adiposæ, and often leading an inexperienced ovariotomist to think that he has opened the peritoneal cavity, and exposed the omentum.

6. The *umbilicus* is merely one of these openings in the linea alba; but the occasional permeability of the embryonal umbilical vein must be borne in mind, as well as the fact that the urachus may also remain permeable, and urine escape from the bladder through it at the umbilicus. I have never seen this in the

adult; but in one case of ovariotomy I found the urachus, though closed at both ends, open for the whole length of my incision in the abdominal wall, and filled by small urinary concretions. Usually it is obliterated, and forms the vesico-umbilical ligament running up along the linea alba from the bladder to the umbilicus.

7. The *deep fascia*, or the layer of areolar tissue between the fascia transversalis and the peritoneum, is very elastic, and only loosely adherent, so that it is easy to separate the peritoneum to a considerable extent without opening it. Indeed, if fluid be free in the peritoneal cavity, the membrane bulges up, like a bluish thin-walled cyst, as soon as the deep fascia is divided.

8. The *peritoneum*. It must be remembered that the obliterated umbilical vessels and urachus, passing from the fundus of the bladder to the umbilicus, are covered by the parietal peritoneum. The inferior epigastric arteries ascending obliquely from Poupart's ligament to the posterior surface of each rectus muscle, also lie between the peritoneum and the integument. The fold from the umbilicus forming the suspensory ligament of the liver has been already alluded to. It is with the later steps of the operation that the peritoneum and its reflections have the most important relations. In connection with the first incision it is only necessary to add that it must be useless to carry this incision nearer to the symphysis pubis than the reflection of the peritoneum from the anterior abdominal wall to the bladder; and it is a safe rule to



stop short of this point, and not carry the lower end of the incision nearer than 2 inches from the symphysis pubis.

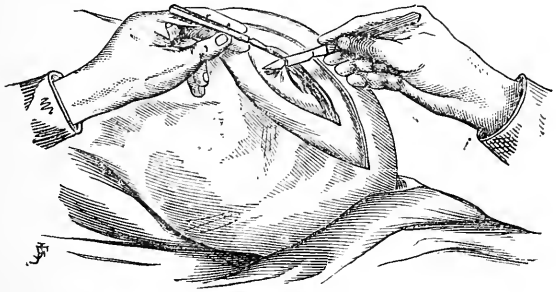
As a rule, the abdomen is tense, and the incision is made with an ordinary scalpel held in the first position, as shown in this drawing. If the operation is performed soon after tapping, and the abdominal walls are very lax, it is convenient to mark, with ink or chalk, the exact line and extent of the incision intended to be made, and then, holding up a fold of integument, to transfix with rather a long bistoury, and complete the incision of the skin with one stroke of the knife. The linea alba and any fat behind the recti muscles may then be carefully divided in the usual way, until the peritoneum is reached. A point also which ought not to be forgotten at this stage of the operation is the possible expansion of the bladder, behind the abdominal wall, by the pressure of the tumour. It is sometimes found flattened, and extending above the umbilicus, covering a space as much as 8 to 9 inches long, and as much wide. I gather from the 'Transactions of the American Gynæcological Society,' 1881, that 22 cases had been recorded in which the bladder had been accidentally opened, of which 14 were known to have died.

If there is any fluid free in the peritoneal cavity, the peritoneum bulges into the deep gap made by the incision, looking like a dark thin-walled cyst, and it has often been mistaken for a cyst; extensive separation has been made of supposed adhesions, while the operator was really stripping the peritoneum from the abdominal wall. When the peritoneum bulges as just described, it should always

be opened, and the fluid allowed to escape, which may be done without wetting the patient or its running over the floor, if the waterproof apron is so held as to direct the fluid into the foot-pan under the table. Even if the bulging membrane were not the peritoneum, but a thin-walled adherent cyst, no harm could be done by this puncture, as it is certainly a good plan to empty the cyst before separating the adhesions. When there is no fluid free in the peritoneal cavity, and an ovarian cyst is not adherent, it is necessary to divide the peritoneum very carefully, or the cyst might be punctured and its contents discharged into the peritoneal cavity. The peritoneum should

be raised with a hook or forceps, the double sharp hook of Adams answering the purpose perhaps better than any other instrument. The membrane is then divided by one or two horizontal touches of the knife, as shown in the next drawing, and an opening made large enough to admit the insertion of a broad director. The instrument known as Key's hernia director is that which I prefer. The end is rounded in imitation of a finger-nail; the groove does not extend within half an inch of the point, and far greater safety from the danger of wounding overlapping intestine is thus attained than by the use of the ordinary narrow directors, where the groove runs quite to the end. Upon this director a blunt-pointed bistoury is passed, and the peritoneum divided to the full extent of the incision in the skin.

On inquiring as to the different lengths of incision in 1,000 cases, and comparing the mortality per cent. with incisions above and below 6 inches, there was found at all stages of my pro-



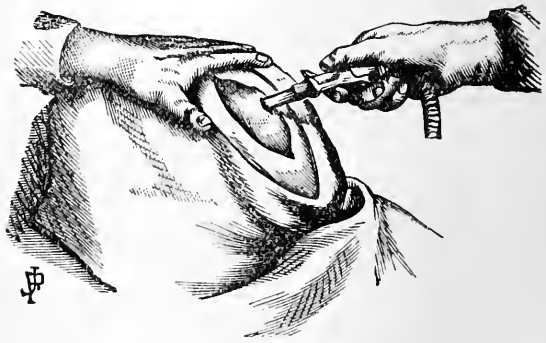
gress the same difference of about 17 per cent. of deaths between the long incisions and the short incisions. The length of the incision, however, is little else than an indication of the gravity of the case, as it cannot be supposed that 2 or 3 inches more of simple division of the parietes of the abdomen would much augment the danger.

The smooth pearly aspect of most ovarian tumours is sufficiently characteristic for immediate recognition, and free movement of the cyst is often visible. But, when a cyst is adherent, it is often extremely difficult to find out the exact limits or boundary between cyst and peritoneum, and, rather than make any improper or dangerous separation, it is better to extend the incision upwards and downwards until some point is reached where the cyst is not adherent. From that point separation of adhesions may be commenced. When there is much fat in the abdominal wall, either in front of or behind the recti muscles, this should be divided by as clean a cut as possible, going through nearly the whole thickness of fat by one stroke of the knife; for, if the fat be much disturbed, troublesome suppuration about the wound is very likely to occur. During the progress of the incision bleeding may be tolerably free, but very often scarcely any blood is lost; and, as soon as the incision has reached the peritoneum, the wound should be carefully cleansed from the blood by soft linen or sponges. Any vessel seen to bleed should be compressed by pressure-forceps. It is important to stop all bleeding from the wound before the peritoneum is opened. It is seldom that any large vessel is divided, but if the compression of the forceps or torsion does not at once stop bleeding, one or more ligatures may be used and both ends may be cut off short close to the knot.

SEPARATION OF THE CYST

I have just said that if a cyst is so closely adherent that it is difficult to ascertain its exact boundaries, it is better to empty it before attempting to separate it, than to run any risk either of separating the peritoneum from the abdominal wall, or of so rupturing the cyst that its contents

might escape into the peritoneal cavity. And adhesions to the intestine or omentum, especially those at the posterior part of the cyst, are also better left until the cyst is emptied and drawn out; the separation being completed when the parts to be separated are in full view. When adhesions are loose, or not extensive, and the cyst has been distinctly made out after the division of the peritoneum, the adhesions may generally be easily separated by one or two fingers, or by inserting the whole hand between the cyst and the abdominal wall—the palmar surface next the tumour, and the fingers curved to adapt the shape of the hand to the convexity of the cyst. Sometimes extensive adhesions yield before a very slight force, but very considerable effort is occasionally required to break them down. Adhesions are very rarely so firm that it becomes necessary to complete their separation by knife or scissors; when this is the case, it is better to cut away some small portion of the cyst and leave it adhering to the intestine or other viscus, than to do any damage by attempting to take away every fragment of the cyst. I have, however, very rarely done this; as, after the cyst has been separated from the abdominal wall, emptied and drawn out with the adhering portions of intestine and omentum, I have almost always been able to make complete separation, although great care has often been necessary to avoid injury to the intestine. I have twice opened intestine when separating adhesions, but accurate adaptation of the peritoneal coat by suture has pre-



vented any mischief. In one case I removed about 3 inches of diseased and adherent intestine, and obtained complete union of the open ends by 2 rows of suture through the peritoneal coat only. Occasionally, instead of separating adhering omentum, it is better to divide it at some unattached point, after the application of a ligature or pressure-forceps, allowing the adhering portion to be removed with the cyst. The permanent suppression of bleeding from separated omentum or parietal adhesions is left until after the emptying of the cyst, securing the pedicle, and cutting away the tumour.

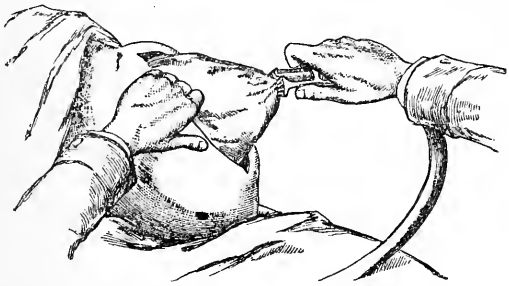
EMPTYING AND REMOVAL OF CYST

When the tumour is found free from adhesions, or after the separation of slight adhesions, the next step is to empty the cyst. The syphon trocar with spring-hooks, held in the right hand, should be

pushed into the most prominent part of the cyst, if this appear to be simple; if multilocular, into that chamber which is likely to contain the largest quantity of fluid. The point is to be drawn within the canula by means of the thumb-piece.

After a portion of the fluid has been drained off, and the cyst has become more flaccid, it is drawn higher up over the canula, and fixed between the prongs of the spring-hooks, which, if properly adjusted, will hold the cyst-wall tightly around the canula. After the first cavity has been emptied, a second, a third, and more if necessary, may be tapped successively without removing the canula from its hold, merely by pushing the trocar forward and thrusting it through the septum which separates the emptied from the adjacent full cavity. In this manner the whole tumour may be emptied of its fluid contents, and its bulk so reduced that it may be drawn through the abdominal opening without undue force. In a case where there are several cysts which cannot be tapped one through the other, they must be emptied singly, either by the same trocar or by another. Great care must be taken, if the same trocar be used, not to perforate the main cyst wall, lest some fluid should escape into the abdominal cavity.

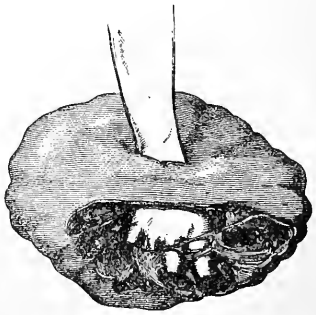
Having succeeded in reducing sufficiently the size of the tumour, the surgeon then draws it through the incision, at the same time breaking down any adhesions which have not been separated before. The assistant opposite to the operator now places his hands on either side of the incision, and prevents the prolapse of the viscera by carefully keeping the edges of the incision in close approximation. He does this best by placing the middle finger of his right hand inside the abdomen,



hooking up the abdominal wall, and then, by the thumb on one side of the opening and the forefinger on the other side, he holds the edges of the opening close together. And he should not allow his attention to be diverted from this very important part of his duty. The assistant at the operator's left hand supports the cyst until it is completely separated, and then receives it in a towel or basin. No traction whatever is permitted, and the greatest precaution ought to be observed in this respect when the pedicle is short, and when there remain undivided adhesions.

In order to lessen the weight of the tumour, cysts which had not been emptied before may be punctured, and secondary cysts, if the septa are thin, may be broken down by the hand, as shown in next column. Great care ought to be taken that nothing gravitates into the abdominal cavity.

But it will not be always possible to reduce the bulk of the tumour sufficiently to bring it through the original incision. Tumours are sometimes met with which consist of solid or semi-solid unyielding masses, or they are divided by trabeculæ into small cavities filled with viscid, colloid substance, which cannot be broken



down, and will not pass through the canula. It will therefore become necessary to enlarge the incision upwards. This is less dangerous than any attempt at squeezing a large tumour through a narrow outlet; either the cyst may burst,

and its contents escape into the abdominal cavity, or the edges of the wound are so bruised that union by first intention might be prevented, or the peritoneum so injured that fatal peritonitis or gangrene may result.

In a few of my earliest cases I followed the practice of previous operators of having flannels, wrung out of water at 96°, carefully wrapped round the cyst or any intestine that escaped, and to protect the peritoneal cavity. But I discontinued this practice, finding that it was impossible to prevent small filaments of wool separating from the flannel and adhering to the peritoneum. Then I used soft linen towels, but for many years past only soft sponges, although towels wetted with warm carbolised water are often useful to cover a large tumour, and protect the intestines. As the cyst is drawn through the opening, a thin flat sponge, 6 or 8 inches in length and about 4 in breadth, should be passed inwards and left between the intestines and the open abdominal wall. This serves the double purpose of preventing escape of intestines, and protecting the cavity from the entrance of anything from outside, or from cooling when spray is used.

TREATMENT OF THE PEDICLE

The cyst or tumour having been drawn out of the abdomen, any omentum or intestine adhering to its peritoneal coat separated, and any bleeding vessel secured, the intestines and peritoneal cavity protected as just described by a flat sponge, the next step is to secure the pedicle. This has been done in different ways, described as the intra-peritoneal and the extra-peritoneal methods.

The older operators, McDowell and Clay especially, adopted a plan which may be considered a combination of both methods. The pedicle was tied, the tumour cut away, and the pedicle was left low down in the abdominal cavity, surrounded by the ligature, while the ends of the ligature were brought out between the edges of the wound. Half an inch to an inch of the lower angle of the wound was left unclosed to admit of the passage of the ligature, as an outlet for discharges, and for the removal of the ligatures and of the tissues strangulated by them.

The intra-peritoneal method was originated, in 1822, by Nathan Smith, who tied two arteries in the omentum with strips of leather from a kid glove. He also tied two arteries in the pedicle with leather ligatures, and after removal of the tumour, cut off the ends of the ligatures short, and left them within the peritoneal cavity, closing up the wound completely. He was followed by Rogers, of New York, who, in 1830, also tied some large vessels, cut off the ligatures 'close to the knot, and left them to absorption.' In England this method was revived by Dr. Tyler Smith, and was followed by many operators. After several years' preference of the extra-peritoneal method, it has again come into favour since the adoption of the antiseptic system.

The other intra-peritoneal methods include the use of the cautery, the écraseur, the twisting off of the tumour, torsion of its vessels, or the separate ligature of the vessels of the pedicle only or of the pedicle itself. In cases where there is no pedicle and the cyst has to be enucleated from between the layers of the broad ligament, ligatures of bleeding vessels, or of parts of the broad ligament, have almost compelled the adoption of the intra-peritoneal method, since the danger of leaving the ends of the ligature passing outwards has been understood.

In the extra-peritoneal method, instead of shutting up the pedicle and ligature, or the eschar made by the cautery, within the peritoneal cavity, the pedicle and the clamp or ligature securing it are carefully fixed outside the closed wound.

I continued to follow, though not exclusively, the extra-peritoneal treatment of the pedicle for twenty years. The clamp was put on for the last time in case 910, August, 1878. I generally used the clamp alone, sometimes combined with the ligature, and in a small number of cases I was obliged to make a pin and ligature serve as a clamp. My extra-peritoneal treatment comprised in all 691 cases out of the 1,000 upon which the calculations in this book are founded. The mortality in the entire group—including the greater mortality of the earlier years—was 23·2 per cent. I used the clamp alone 623 times, losing 20·22 per cent. The clamp and ligature combined were attended with a loss of 30·61 per cent., and when the pin and ligature were employed the deaths went up to 35·23 per cent. The bad nature of the cases was the cause of the combination,

and accounts for the great mortality. But the clamp alone furnished me with a lower rate of mortality, 20·22 per cent., than the aggregate of the 1,000 cases, 23·2 per cent., and the results from it were more favourable than those of any other kind of treatment, except that by the cautery. It contrasted well with the ligature, especially during the early years, when the returned ligature caused me a mortality of 49·12 per cent., though ultimately this came down to 20·19 per cent., as near as possible the same as the clamp. When I looked into the question of mortality among my first 500 cases, and found that the clamp gave me a mortality of 5 per cent. less than that of the mortality of the whole series, and that the ligature raised the death-rate 19 per cent. above that of the clamp, I felt that I had full justification in persevering with the extra-peritoneal treatment. In the second series of 500 cases the clamp mortality was again below that of the general mortality, and within a fraction the same as that of the cases in which the ligature was used, by this time down to 20·19. Even during the last two years of my hospital practice, 1876–1877, when the diminution in the rate of mortality from 21 to 10 per cent. took place, I was using the clamp in more than two-thirds of the cases. These results prove that I was not wrong in acting as I did; and that, judging by all the evidence forthcoming at the time, except that with regard to the cautery, the clamp extra-peritoneal treatment of the pedicle was better than any other I had adopted. Upon the whole, it is questionable whether, if I had at an early period given up the clamp and worked my way with the ligature through all the difficult problems presented by the novel conditions of the cases as they successively came under treatment, the result would have been better, or even so good. At any rate, such treatment was at one with the accepted doctrines of the day about the pedicle, which, some contend, still hold good in reference to the stumps of uterine tumours; and it had compensations for some of the evils which, so long as the question of contagion was overlooked, attended the use of the ligature.

Although the clamp is now almost disused, it is so simple, safe, and rapid a mode of dealing with the pedicle for an inexperienced operator, that it is well to repeat the directions for its use given in my edition of 1872.

The next drawings were made when I was actually applying the form of clamp which I last used. The tumour was held up by one of the assistants, the clamp passed round the pedicle, as shown in the above drawing, and one hand is shown pressing the blades of the clamp together by the forceps, which should be held very firm while the screw which fixes the clamp is being tightened by the other hand, as shown in the next woodcut. After the tumour has been cut away, it is sometimes necessary to tighten the clamp or the screw still further. The assistant

keeps the abdominal wall closed around the pedicle, as shown in the same drawing, also from the life; while the surgeon, holding the clamp-forceps with his left hand, fastens the screw with his right, assisted by the needle-holder.

It would seem unnecessary to add that the surgeon should be careful not to enclose anything but the pedicle in the clamp, but the fact that cases are on record where a portion of the bladder has been squeezed, and where one ureter has

been strangulated, and that I have myself seen a strip of omentum several times, and a coil of intestine once, very narrowly escape constriction, shows that the caution is not uncalled for.

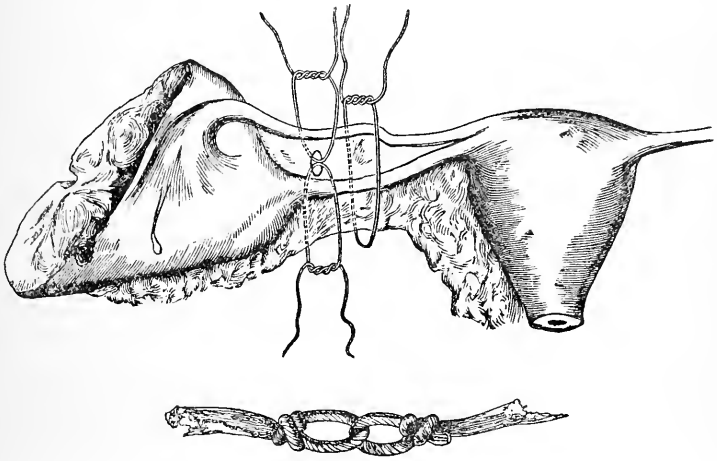
The pedicle with the clamp should be fixed as near to the lower end of the incision as can be done without traction, and the edges of the wound are brought in contact around it.

Any superfluous portion of the pedicle protruding beyond the clamp is cut off, but not quite close to the clamp, for this would lead to the danger of the pedicle, as it shrinks, sinking or being drawn inwards. It is as well to leave about a quarter of an inch protruding beyond the clamp, and this should be touched with solid perchloride of iron, by which the tissue is tanned until it becomes quite dry and is preserved from decomposition.

Those who exclusively follow the intra-peritoneal method, and either use the cautery or return the ligature and close the wound, appear to have been influenced by objections to the extra-peritoneal method which seem to me to be either groundless or trivial. When the pedicle is held outside the wound by a clamp or in any other way, the pull upon the uterus or broad ligament is said to be very painful; but I have seen a good deal of pull with very little pain, and much more severe pain in cases where the ligature was used than I ever saw in clamp cases. So with sickness: I have seen as much or more after the ligature or cautery, as I ever saw after the clamp. It is said to set up fetid discharge and poison the wound or the patient; and so it does if proper care be not taken. But if the strangulated part of the pedicle which projects beyond the clamp be well saturated with perchloride of iron, the slough is tanned; it becomes as hard and dry as a piece of leather, and there is an end to that objection. It is said to cause suppuration about the wound; but this, again, I have seen both after the ligature and cautery. I never saw more profuse suppuration of the stitches than in one case where I divided the pedicle with the écraseur, and closed the wound with platinum-wire sutures. Then, after the wound is closed, it is said to lead to a reopening each month, and an escape of some menstrual fluid. And this is true in some—perhaps in nearly a third—of the cases. But if the patient be prepared for it, it is not of the slightest consequence. The Fallopian tube almost always contracts completely after a few months, and there is no further escape. I can only recollect two cases where it has continued up to the date of the last report from the patient, and then it caused but slight inconvenience. As to any fancied impediment to the increase of the uterus in pregnancy, and to its contraction during labour, from the adhesion of the tube to the cicatrix, I can say that many women have had 1 child, some 2, some 3, and others as many as 6 or 7 children; and in no case has

any unusual suffering been referred to the adhesion of the pedicle to the abdominal wall. One *real* objection to the clamp is that it may possibly pull on intestine, or a tense pedicle may strangulate intestine. But this objection is of little weight if the use of the clamp is restricted to cases where the pedicle is so long that there is not much drag on the clamp. Where, however, we have a broad, thick, short pedicle, or a broad connection between uterus and cyst rather than a distinct pedicle, we have the choice between one or other of the intra-peritoneal methods; and since the great success which has attended the combination of antiseptic ovariotomy and the complete intra-peritoneal treatment of the pedicle, the extra-peritoneal method may be considered as almost abandoned, and we have to choose between the ligature and the cautery.

In ligaturing the pedicle of an ovarian tumour, it is never safe to trust to a ligature which does not transfix the pedicle, unless this be very long and slender. Many cases are on record where, after cutting away the tumour, a simple encircling ligature has slipped off, and dangerous or fatal bleeding has followed. It should be a rule, therefore, always to transfix a pedicle, and, according to its size, to tie it in two or more portions, before the cyst is cut away. A long ordinary needle double-threaded, or a long blunt-pointed, straight or curved needle on a handle, may be used. The latter is safer and more convenient if



the pedicle cannot easily be brought well outside the abdomen. Both threads having been carried through the same puncture, one is tied above and one below the Fallopian tube, as shown in the sketch, a second turn having been given to the first loop to prevent slipping when the second turn securing the knot is made. For additional security a separate ligature may be tied between the two first passed and the uterus. Mr. Bryant and some other operators think it important that one loop should be laced within the other, as shown in the lower sketch. But I rather avoid this, as it is possible that by so tying the second knot the first may be loosened. Supposing a clamp or pressure-forceps to have been first applied, the cyst cut away, and the pedicle then transfixed and tied between the forceps and the uterus, the clamp must be loosened or the forceps removed before the ligatures are tightened. If this is not done, the knot cannot be tied so tight as to be secure after the clamp is removed. As the clamp is taken off, the tissues compressed by it retract, and are apt to slip from under the ligature. This can only be avoided by tightening the ligature simultaneously with the loosening of the clamp or removal of the forceps. Mr. Doran's observations lead him to the conclusion that 'it is much more dangerous to draw the ligatures a little too firmly, than to leave them somewhat looser than is strictly advisable;' and Mr. Thornton considers the presence of blood-clot on the cut surface of the stump 'as the perfect condition to aim at in the treatment of the ovarian pedicle

by ligature. This cap of blood-clot shows that the ligatures, while tight enough to prevent serious hæmorrhage, were not so tight as to cut off all supply from the distal portion of the stump.' I differ entirely both from Mr. Doran and Mr. Thornton, and—fearing that a loose ligature will become looser as the included tissue shrinks, that bleeding would be probable, and that unless a ligature sinks deeply into, or forms a deep groove in the pedicle, the surfaces of peritoneum on either side of it are less likely to unite, cover up the silk, and maintain the vitality of the stump—I always tie the ligature as tightly as I can.

If it be desired only to tie the vessels, this may be done by feeling the arteries, and carrying a ligature round them through the pedicle before the cyst is cut away; or, after the application of forceps and removal of the cyst, holding the pedicle carefully as the forceps are removed, and tying any vessel which bleeds. The great objection to this plan is, that there is often much loose cellular tissue, rich in small veins, which go on oozing after all the larger vessels have been tied. Whichever may be the plan preferred, the important question arises: Shall the ends of the ligatures be cut off, and the wound closed? or shall they be left hanging out through a part of the wound, purposely left open for their passage, and that of the slough they embrace when it separates? Dr. Clay, of Manchester, advocated this latter practice. In its favour, it has been said, that it is a method applicable in all cases; that it secures an outlet for serum from the peritoneal cavity; and that, after the separation of the ligature and slough, no foreign body is left within the patient. But it seems to me that the ligature-threads act as a sort of seton in the peritoneal cavity, excite the formation of the serum for which they are said to provide the outlet, and counteract antiseptic precautions. Having tried both methods, the results very soon led me to discontinue this practice, and to drain by a glass tube rather than by the ends of a ligature. On this question of drainage I shall have more to say hereafter. One objection is, that even if the patient recover, there is a great liability to ventral hernia. The cicatrix remains weak at the spot where the tube or ligatures passed out, and it yields before the pressure outwards of the viscera. I have seen this in nearly every case where I adopted this plan. In several it followed the clamp, and in some, but in smaller proportion, where the complete intra-peritoneal method was practised, and I have come to the conclusion that if we use one or more ligatures, it is better to cut off the ends short, and close up the wound completely. Wire has been used for the ligature, but it seems an irrational practice. Silk, if pure, is an animal substance; and experiment proves that it may be absorbed. Wire cannot be absorbed, and must be more or less of a mechanical irritant. I tried wire on one side and silk on the other side of a sheep on which Professor Gamgee operated for me, and the superiority of the silk was manifest. What we have to look to is the effect on the tissues strangulated, rather than the material by which the strangulation is effected. Catgut has been used, but I know of nothing to show that it is superior to carbolised silk. Professor Billroth thinks it necessary to boil the silk in a 5 per cent. solution of carbolic acid, and there is no objection to do this. His results certainly improved after using boiled silk.

Supposing there is no true pedicle—that the cyst is more or less completely encapsuled in a layer of broad ligament, or an expansion of the peritoneum—this capsule may be divided, and the cyst shelled out of it, or the base of the cyst with its enveloping capsule may be transfixed and tied in two or more portions before cyst and covering are cut away. This is what many operators have termed a very short broad pedicle. In some cases the Fallopian tube, more or less elongated, is so closely attached to the capsule that it is better to include it in the ligatures, and cut away all the attached part. In others it is unaltered, and quite free from the capsule. Then it is better not to interfere with it. The ovary also may be either free or attached. If normal and free, this also is better left undisturbed; but if closely attached, or, as it sometimes is, stretched into a cordlike or flattened outer layer of the cyst wall and capsule, its removal is almost inevitable. In case of doubt it is better to remove than to leave it, even if separation is not difficult.

If, after enucleating a cyst, any considerable part of the capsule remain, and especially if any oozing of blood continues from the inner surface, all the loose part

of the capsule should be drawn up, its base transfixed and tied, and the capsule cut away. In the very rare cases where a cyst cannot be enucleated from the capsule or broad ligament, or from the retro-peritoneal attachments, we must either be content with removing the fluid contents and closing the abdominal cavity, or employ drainage. The choice of the two methods should be determined by the character of the contents of the cyst. If clear, watery fluid only, the safer practice is to close the abdomen. But if colloid, or purulent, or dermoid, drainage is certainly the preferable practice.

The question, what becomes of a ligature, and of the tissues strangulated by it, when closed up in the peritoneal cavity, is a very important one. It is certain that the changes differ widely from those which follow the use of the ligature when the ends are left to pass out through the partially closed wound. In this case they lead to free discharge of serum or pus, until the separation of the ligature and the slough. Whatever may be the material of the ligature, the tissues strangulated by it come away after a process of suppuration; and if anything like what goes on outside the body when one of the extra-peritoneal methods is adopted, or when the wound is left open for the ligatures, went on when the wound is closed, no patient could survive the process. She would certainly be poisoned by absorption of the fetid products of the decomposing stump. A very different series of changes must go on when the wound is closed and access of air shut off. Experience shows that patients survive the process; and examination of those who have died has shown that a pedicle secured by a silk ligature has been found some days afterwards, either, first, surrounded by coils of adhering intestine; second, as the centre of a purulent cavity; third, very little altered, with the ligature deeply imbedded within it; and fourth, completely dead or gangrenous. All these different conditions I have actually seen accompanied by more or less evidence of peritonitis, and depending more, I believe, on the general health of the patient and the conditions in which she was placed, than upon any difference in the material of the ligature or the mode of its application. I must now, of course, add that among the conditions in which the patient is placed, we attach paramount importance to the presence or absence of infective or putrefying matter.

Our knowledge of this subject has been greatly increased by the report of the experiments of Spiegelberg and Waldeyer. Their experiments were arranged in two series: 1. Excision of portions of the horns of the uterus of bitches, leaving the ligatures in the peritoneal cavity; and 2. Removal of portions of the uterus by the galvanic cautery. The conclusions of the experimenters are that small foreign bodies may be left in the peritoneal cavity without danger, and that strangulated and cauterised tissues do not become gangrenous, and are not injurious to neighbouring parts, provided only that the abdominal cavity is perfectly closed.

As to the ligatures, they show that they are absorbed after their fibres have been separated and disintegrated by the ingrowth of cells from neighbouring parts. They are generally encapsuled, but may sometimes be found free in the peritoneal cavity or in cystic cavities of the stump. The divided surfaces adhere to some adjacent structures and form vascular communications without any trace of gangrene. New cells spring up from the tissues around and unite with the granulations of the cut surfaces. There is no trace of gangrene in the ligatured part, and new cell formations enclose the ligature.

The vessels of cauterised parts are blocked by clot, and the dead tissue is encapsuled by growth of new cells. In 14 or 21 days the cauterised surfaces are covered over by new tissue formed from the cells supplied by the surrounding structures.

Maslowsky corroborated the observations of the German experimenters, and showed that the eschar from cauterisation is first covered by effused fibrine, and afterwards united by membrane with surrounding organs. The white corpuscles participate in the formation of the new membrane, in which capillaries may be found as soon as the 4th or 5th day.

In some respects the experiments are satisfactory, as they tell us what really does take place when a ligature or an eschar is shut up in the peritoneal cavity; and we may resort to the cautery or the ligature with a pretty accurate idea of the process of repair and of the dangers which may attend this process.

Doran, in two papers in the 13th and 14th volumes of 'St. Bartholomew's

Hospital Reports,' gives the results of his own observations of 10 cases where he examined the ligature and pedicle at various periods after ovariotomy; all proving that the tied or strangulated stump is not killed, but that 'a communication between the distal and proximal parts of the stump is established by inflammatory plastic effusion, and the ligature is unravelled by granulation-cells insinuating themselves between its fibres.' He also shows that the distal part of the stump may soon form an intimate adhesion with the neighbouring broad ligament.

It must not be forgotten that even in healthy dogs and rabbits where the ligature or the cautery was considered by the German experimenters to have been most successful, adhesion of the tied or cauterised part to the bladder, to intestine, and to neighbouring folds of peritoneum, has been the rule, just as in cases which I have placed upon record where adhesion of the tied or cauterised pedicle to intestines has led to fatal strangulation. Even if not fatal, such adhesions are more likely to lead to obstruction of intestine more or less serious and prolonged, and to be permanently injurious, than the mere adhesion of a pedicle to the abdominal wall.

Acupressure was once applied successfully by Sir James Simpson. He secured the pedicle by passing a long needle through the abdominal wall, across the pedicle, and out again. The pedicle was thus compressed by the needle on the outside of the abdominal wall in the left iliac region.

Sir William Fergusson once tried this plan, but was obliged to resort to the ligature. I have never tried it myself, though I have more than once found acupressure useful in stopping bleeding from vessels torn in separating adhesions.

The écraseur has been used for the compression and crushing of the pedicle and separation of the tumour; after which the pedicle is dropped into the abdominal cavity and the wound closed. Grave objections, however, against this practice are the possibility of hæmorrhage and its dangers, and the difficulty of finding and securing the bleeding pedicle in the depth of the abdominal cavity after having re-opened the wound. This would be especially difficult if hæmorrhage occurred after some lapse of time. I once used the écraseur and successfully; but I have not ventured on it again, for fear that bleeding might occur. This danger might be prevented by tying a ligature below the écraseur chain, before separating the cyst and dropping the pedicle into the abdominal cavity. But then it would be only a modification of other methods of ligatures.

The *cautery* alone would fail to stop such large vessels as are frequently met with in a pedicle. So might the crushing which precedes the division by the écraseur. But *the combination of crushing and the cautery* is certainly efficacious in a considerable proportion of cases. Clay, of Birmingham, introduced the practice and carried it out by his adhesion clamp and hot irons, both for dividing adhesions and omentum. The practice was extended to the pedicle by Baker Brown, and has since been used chiefly by Keith. It is claimed for it that in most cases it effectually stops hæmorrhage during the operation and prevents it afterwards, that it leaves only a very thin layer of burnt tissue at the end, and is followed only by the changes described in a former page. This method is of most value in cases when the pedicle is broad, thick, and short; it does not answer well when large vessels ramify in a thin membranous pedicle. Notwithstanding the great advantage of the cautery, its use is attended by serious drawbacks. Vessels not unfrequently bleed on opening the blades of the clamp, and a repetition of the whole tedious proceeding, or the use of ligatures, is necessary before the pedicle can be returned into the abdomen with safety. The instrument used for compressing the pedicle and various cauteries, with the mode of using them, have been described in the last chapter.

When dividing the pedicle and separating the cyst, the utmost care must be taken to prevent any of the contents entering the abdominal cavity. Should this happen notwithstanding all the precautions taken to avoid it, the cavity must be carefully sponged and cleaned of all extraneous substance with soft sponges wrung out of warm carbolised water.

The omentum, the mesentery, and the situations of the adhesions to the anterior abdominal wall will often be found the seat of hæmorrhage, either from the orifices of large vessels or from capillary oozing. The bleeding must be stopped by tying the vessels with ligatures, the

ends of which are to be cut off close to the knot, or by torsion, or by the pressure of a needle passed across.

The following table shows the results of my own trials of various modes of dealing with the pedicle in 1,000 cases:

	Cases	Recoveries	Deaths	Mortality per cent.
Clamp	623	497	126	20·22
Pin and ligature acting as clamp	17	11	6	35·23
Clamp and ligature	49	34	15	30·61
Ligature returned	260	191	69	26·53
Ligature brought out	14	6	8	57·14
Cautery	16	14	2	12·5
Cautery and ligature	14	10	4	28·57
Ecraseur and pin	2	2	0	0
Forceps and ligature	1	0	1	100
No ligature—enucleation	3	3	0	0
Cyst wall sewed to abdominal wall	1	0	1	100
	1,000	768	232	23·2

As soon as the pedicle has been secured, the tumour removed, and bleeding vessels have been tied, the other ovary should be examined. It is found by grasping the fundus of the uterus, and passing the hand downwards along the tube and side of the uterus. The surface may be irregular from recently matured follicles, but these need not lead to interference unless the ovary is two or three times its normal size. If any follicles are very large, they may be punctured, and the clot they contain squeezed out. If the ovary is hardened or enlarged, it should be removed. When the clamp was used the pedicle has sometimes been long enough to admit of the application of two clamps outside the abdominal wall with little more inconvenience to the patient than one. In other cases I have transfixed the pedicle of the second tumour, tied it in two or more portions, brought it outside, and tied it to the clamp securing the first pedicle. Recently I have always tied both pedicles with silk, cutting off the ends short, just as when only one ovary has been removed.

Besides examining the second ovary, the state of the uterus should be ascertained. It may be enlarged by pregnancy, or by fibroid growths. In one case, after completing ovariotomy, I also removed a fibroid outgrowth from the fundus uteri. This patient died, and I think she would have recovered if I had left the uterus alone, as I have done in several cases since, where the size of the growths was insignificant. But when they have been large enough to cause much inconvenience, I have removed them at the same time as the ovarian tumour. In one case the patient recovered after removal of a uterine tumour nearly as large as the ovarian, and from another I successfully removed a dermoid cyst of the left ovary, and a fibroid outgrowth from the right side of the uterus at the one operation.

SPONGING OF THE PERITONEUM

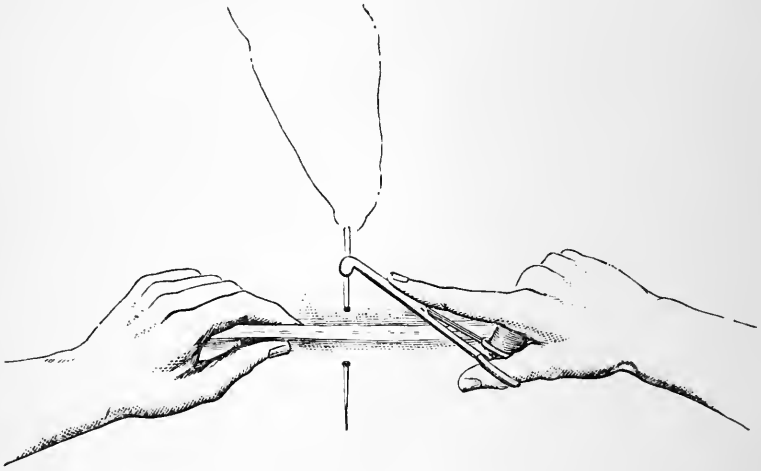
Before proceeding to close the wound, the peritoneal cavity must be thoroughly cleansed from any fluid or clot which it may contain. A good deal of fluid may be pressed out, or scooped out by the hand; but complete cleansing can only be attained by using many clean, soft sponges in succession, passing them well down behind and in front of the uterus, along each flank in front of the kidneys, and over the abdominal wall wherever adhesions have been separated. Any clot which may be seen or felt among the coils of intestine or folds of omentum must be removed. When I began to insist upon the importance of this process, which Worms described as *la toilette du péritoine*, other operators said that it was unnecessary or injurious; that ovarian fluid in the peritoneum was harmless; or that the time lost in removing it, and the irritation caused by the sponging, were greater evils than a little fluid or blood left in the cavity. Impressed by these objections, I was in one case less careful than usual in sponging away ovarian fluid. A fatal result followed, and I have ever since been extremely careful to remove all by thorough sponging, and have been well satisfied with the results. I have regretted incomplete sponging, never that I had been too careful. And it is convenient to insert a large, flat piece of sponge just within the wound, and leave it all the time that the sutures are being passed. It catches any drops of blood which may follow the passage of the needles, and if spray be used protects the cavity from the cooling effect of the spray or the entrance of carbolic acid.

CLOSURE OF THE WOUND

The next step will be to close the wound. In my early cases I did this by

passing hare-lip pins through the whole thickness of the abdominal wall at intervals of an inch. Each pin perforated the skin about an inch, and the peritoneum about half an inch, from the incision on either side; so that when the two opposed surfaces were pressed together upon the pin, two layers of the peritoneum were in contact with each other. But I soon began to prefer sutures to pins, and tried different materials for this purpose. After repeated trials I found thin strong Chinese silk superior to other materials for closing the wound, as I had for tying the pedicle. For some years I have soaked the silk in a 5 per cent. solution of carbolic acid before using it, and Billroth's experience proves that it may be safer to boil the silk.

The most convenient manner of applying the sutures is the following: Silk about eighteen inches in length is threaded at each end on a strong straight needle. Each needle is introduced by a holder from within outwards, through the peritoneum and the whole thickness of the abdominal wall, at about one-third of an inch from the cut edges of peritoneum and skin on either side — pinching up peritoneum and skin together, so that the silk may be carried through both without perforation of the recti muscles. The ends of the sutures are held by the assistant, who draws up the lips of the wound until all the deep sutures have been applied. Then the lips of the wound are held apart again, in order that the operator may convince himself that no



further bleeding has taken place within the abdominal cavity, which, if required, has to be sponged again, and the protecting sponge removed. This done, the sutures are tied, carefully adapting the edges of the skin to each other without inversion or eversion, and the ends of the threads are cut off. If the abdominal wall is very thick, superficial sutures may be required between the deep ones. If the pedicle has been secured by the clamp, a suture should be passed close to the latter, in order to bring the lips of the wound so accurately around the pedicle that the peritoneal cavity is perfectly closed.

DRESSING AND BANDAGE

After the closure of the wound, the abdomen is carefully cleaned and dried, the india-rubber cloth removed, and the wound covered with some non-irritating antiseptic gauze, or salicylic or boracic wool, and supported by long strips of adhesive plaster. In many cases the false ribs have been pressed outwards by the tumour, and after its removal a deep hollow is left. This must be filled up with pads of cotton-wool. A flannel belt is fastened around her abdomen by pins, and the patient is then gently removed to her bed. She is kept on her back, her knees supported by a pillow, is covered with light but warm blankets, and provided with hot-water bottles, if she is at all chilly. The room is darkened, and she is left alone with her nurse. After ovariotomy and other serious operations, patients rally much more rapidly if the head be kept warm, covered up with a shawl or

flannel. When we reflect how temperature is lowered by cooling the head, it is not difficult to understand that warming the head until reaction after shock is well established may be very advantageous. If reaction is slow, the head should not be raised by pillows, but kept low.

CHAPTER VIII

ACCIDENTS DURING OVARIOTOMY

Fainting is an accident which may happen in any operation, and before the use of anæsthetics was not uncommon. I have, however, never been embarrassed in my ovariotomies by this condition. And only in one case has the methylene caused any trouble. Then the pulse became for a while imperceptible, and we were obliged to give brandy. The woman rallied. She had some thoracic complication, and though the cyst only contained about 16 pints of fluid, yet, as the removal was very quickly over, it is possible that the enfeebled heart and lungs were unable to accommodate themselves to the sudden change of pressure.

Out of the 127 deaths which followed my first 500 operations, 20 were put down as the effect of exhaustion, and none from hæmorrhage; while in the second series of 105 deaths there were only 8 from exhaustion and 2 from hæmorrhage. The probability is that some of the first series of deaths were also partly due to bleeding, but the fact was not established by examination. The deaths from exhaustion were mostly at the end of 2 or 3 days, but in 1 as early as 13 hours. No case of collapse after the operation happened in the second series, but in the first there were 6 cases —the time being from 2 hours to about 40 hours. No death has ever occurred during the operation either from shock alone or the anæsthetic.

Thus out of the 232 deaths after 1,000 operations only 36 are immediately attributable to shock and hæmorrhage, a proportion lessened by increased experience. The remaining mortality of 196 was due to other causes; and, considering the large proportion of septic disease which proved fatal during the earlier years, was to a great extent avoidable. The mortality of 3·6 per cent. from shock and hæmorrhage corresponds very nearly with the results of Keith's practice, in which there are very few deaths recorded as from secondary causes; while in my own experience in private cases and since adopting Listerian details, I have had only 3 immediate deaths, 2 from cardiac embolism in about 20 hours, and one from hæmorrhage almost immediately after the patient was in bed. But this was not a case of ovariotomy only. It occurred since the completion of the 1,000 cases, and I unwisely, after removing an ovarian tumour, attempted to remove a cyst of the liver. In one case of secondary bleeding which came on shortly after the operation was finished, I reopened the wound, put another ligature on the pedicle in lieu of the one which had slipped, and left the patient not the worse for the accident. She got rapidly well. In another case I feared that the patient was dying of internal bleeding, but the father and brother, both medical men, were opposed to the reopening of the wound, and would not permit an examination after death, so that I am not quite sure how far my fear was well founded. In 1882 secondary bleeding occurred a few hours after operation on a lady aged 62. I opened the wound, found that the ligature had slipped, transfixed and tied the pedicle, sponged out the peritoneal cavity, and reclosed the wound —assisted by Mr. Fuller of Piccadilly. The patient did not seem much the worse for the accident, but she died on the 5th day.

Burst cysts and suppurating cysts do not seem to have lowered the success of my operations. There have been 15 such cases, 12 burst cysts and 3 suppurating cysts, among my 1,000 operations, and only 1 death resulted. My experience of 139 cases since the 1,000 gives 6 cases where the cysts had burst; of these 3 recovered and 3 died.

Injuries to viscera.—Several cases are on record, and I have heard of others not recorded, where the bladder has been injured either in making the first incision or in separating adhesions between the cyst and the bladder. Should the bladder be injured, the opening should be very carefully closed by suture, and a catheter maintained in the bladder for several days. As a rule the effects have not been serious, although in some cases the urine has drained through the wound for several days. In one case where I had cut into a patent urachus from which urine escaped, I closed the opening by one of the sutures which closed the incision in the abdominal wall, and no inconvenience followed. In 1881 Professor Billroth, in making a double ovariotomy, was obliged to resect part of the bladder and some inches of small intestine on account of adhesions between these parts. And in another double ovariotomy, done at the Salpêtrière by Professor Pozzi in December 1882, though all due precautions had been taken to empty the bladder, there was found, after opening the peritoneum, a layer of what appeared to be a membranous expansion, the product of some old inflammation. An incision of at least 10 centimetres, corresponding with that in the peritoneum, was made through this. After removing the two ovaries, and when preparing to close the abdominal wound, the supposed membrane, on being examined, proved to be the bladder. It had in no way contracted after the use of the catheter, and the hand could be easily passed into it through the wound. Professor Pozzi had therefore to deal with a wound of both the anterior and posterior coats. The posterior one he closed completely with sutures. That in front was partially sewn up, and the opening left was made to correspond exactly with a part of that in the abdominal wall. A siphon-tube was arranged to drain away the urine, and the bladder was, from time to time, washed out with a solution of boracic acid. By the end of January the urine began to pass naturally; in March the fistula was closed, and the woman entirely recovered.

The rectum has been torn or divided during the separation of adhesions, in some cases with fatal consequences; in others, where accurate closing has been effected by suture, recovery has followed without any fæcal fistula. In a patient on whom I operated in July 1876, removing a tumour of the right ovary, the left having been removed 3 years before, the cyst was drawn out with a coil of adherent intestine. This was carefully separated, but not without a tear, leaving an opening sufficiently large to admit one finger. I inverted the edges of the opening so as to bring two surfaces of the peritoneum in apposition, united them by a continuous silk suture, and the patient recovered without any ill effect from the accident. In another case operated on in the Samaritan Hospital in June 1875, in removing a malignant growth weighing 41 pounds, I also detached and cut away about 3 inches of small intestine, the coats of which were involved in the disease. The upper and lower ends of the gut were brought together and united by peritoneal suture, but the patient died on the 11th day. Although some fæcal fluid had escaped from the wound in the abdominal wall, the bowels had acted freely in a natural manner, and it appeared that the wound in the intestine had but little to do with the fatal result. The practical lesson from this is to be extremely careful when separating adhesions between the cyst and intestine, and if the intestine is either accidentally wounded, or a diseased portion is intentionally removed, the union of the peritoneal edges by fine sutures must be very accurately completed.

The liver has been injured during the separation of adhesions. In one case, in an insane patient under the care of Mr. Archer, of St. John's Wood, I removed some ounces of the lower edge and under surface of both lobes of a large liver. I had considerable trouble in stopping the bleeding, and applied perchloride of iron freely. The ovarian cyst for which I was operating was a very large one, and the patient in an extremely feeble condition after repeated tappings, yet she recovered rapidly and completely as in the most simple case, is still alive, and has regained her soundness of mind as well as body. In one other case, already alluded to, I lost a patient from hæmorrhage after opening a cyst which projected from the under surface of the liver, the walls of which poured out blood with extreme rapidity in spite of all efforts to check it.

I have never met with a case in which the spleen has been injured during

ovariotomy; but an enlarged spleen has been occasionally mistaken for an ovarian tumour, and splenic cysts mistaken for ovarian cysts have been removed more than once. Should either of these mistakes be recognised after beginning an operation, the surgeon must act exactly as if he were doing splenotomy.

If a kidney should be unavoidably or accidentally removed with, or instead of, an ovarian tumour, as much care would be called for in securing the blood-vessels as in a case of nephrectomy planned beforehand. One or both ureters are known to have been divided or tied accidentally. In Simon's famous case, where a urinary fistula remained after injury to the right ureter, Simon removed the right kidney, and I saw the woman some months afterwards in excellent health. In a similar case Nussbaum, instead of removing the kidney, re-established communication between the kidney and the bladder. It is remarkable that in cases of adhesions low down in the pelvis the ureters should escape injury so often as they do. I suspect that their condition has been overlooked in some post-mortem examinations, and it is probable that in some of the cases where suppression of urine has been a prominent symptom, one or both ureters may have been injured. I have heard of one case where after death one ureter was found tied.

After passing the sutures which are to close the opening in the abdominal wall, and before tying them, the sponges and forceps should be counted. It is a good plan to take a fixed number of sponges and forceps to every operation. By forceps I mean the torsion or pressure-forceps, the use of which has been already described. Of these I always take 12, of sponges 20. If any other than the usual fixed number be taken, some doubt is almost certain to arise when the nurse is told to count the sponges. Very small sponges are so easily lost, that it is advisable not to use any which when wet are smaller than an ordinary fist. Even then it may not be easy to find one when wet in the peritoneal cavity. It is a good rule for the surgeon strictly to forbid either of his assistants to put a sponge within the abdominal cavity. No one should be allowed to divide a sponge. One of my friends abroad writes that in one of his fatal cases a sponge was found in the peritoneal cavity. He had suspected that a sponge might be within the abdomen at the end of the operation, but could not find it, and on counting the sponges the number was complete. It afterwards appeared that one had been torn into two by one of the nurses. No one who has not tried it can understand how difficult it may be sometimes to find a lost sponge.

In my lectures as Hunterian Professor at the Royal College of Surgeons in June 1878, I gave the following account of a case in which I left a pair of forceps in the abdomen. 'Not very long ago I removed both ovaries, and a great many forceps were used. After removing one ovary and securing the pedicle, the other ovary had to be removed. It had a very short pedicle, and 5 or 6 of my torsion-forceps were put on in order to secure the bleeding vessels, while I was tying them separately. I took off, as I thought, every pair of forceps, closed the wound, and everything seemed quite as it should be. But about 2 hours after the operation I received a message from a friend who was putting up the instruments for me, to say there was a pair of forceps missing. We knew exactly the number of forceps. If we had not known that, one pair would not have been missed. This shows how necessary it is always to know how many forceps are taken. It was about 5 in the afternoon when I had this message: 'There was a pair of forceps missing, probably they might be in the patient.' Imagine the sort of feeling with which one would receive that intimation. I at once went to the patient. She seemed so well that I did not like to disturb her. There was some doubt where the forceps might be, so I thought I would wait a little longer. I waited till night; she still seemed pretty well, and I thought I would wait till the morning; but in the morning the nurse told me the lady had been very restless. I then made a very careful examination, by the vagina, and rectum, and abdominal wall, to see if I could feel the forceps, but there was nothing to be felt at all. Still I was uneasy, and I thought I had better open the wound. So I gave her methylene, removed the dressing, and took out two stitches. I put one finger in, but at first could not feel the forceps. At last I found something hard, put another finger in, and found the forceps wrapped up in the omentum. From the way in which the omentum had insinuated itself into the

ring handles of the forceps, it was easy to understand how difficult it was to find and remove the instrument; but I did it, returned the omentum, closed the wound, and the patient was none the worse. She got well, and to this day does not know that anything unusual occurred.'

I purposely avoid relating a case where a pair of forceps was found in the bladder of a patient a month after recovery from ovariotomy, as the occurrence is still to me inexplicable. It did impress upon me, however, what I had often before told others, that the surgeon should take all the instruments and sponges—not allow assistants or nurses to supply either—and never to neglect counting both. I ought to have added that this should be done before closing the wound, and thus avoid such an unpleasant accident as happened to me last year in a case where I was operating without either of my usual assistants. The patient was in bed before the forceps were counted. One pair was missed before she had quite recovered from the anæsthetic; a little more was given. I took out two stitches, and found the forceps without much difficulty. The patient made a good recovery. I repeat the caution, always to count both sponges and forceps before closing the opening in the abdominal wall.

CHAPTER IX

ON THE REMOVAL OF BOTH OVARIES AT ONE OPERATION

Some writers on ovarian disease have asserted that the right ovary is much more frequently diseased than the left, and that coexisting disease of both ovaries is extremely rare. But, on examining the grounds for these assertions, we find that they are principally based upon examination of patients during life, or patients who have not been submitted to ovariotomy.

When we come to examine the result of post-mortem examinations we find that, as there is no anatomical or physiological reason why the right ovary should be more frequently affected than the left, so, in fact, one ovary is found to be diseased as often as the other.

Of 80 cases collected by West from Scanzoni, Lee, and his own notes of post-mortem examinations, in 28 the disease was on the right side, in 26 on the left side, and in 26 both ovaries were diseased—so that in about one-third of the cases both ovaries were diseased. In 1865 Scanzoni again drew attention to this subject in a paper 'On the Relation of Disease of both Ovaries to the Ovariotomy Question.' He gives the result of an examination of the reports of post-mortem examinations for the previous 14 years by Virchow and Förster. These records were examined with the sole object of ascertaining in how many cases one or both ovaries were diseased. In 99 cases of ovarian disease it was found that in 48 one, and in 51 both ovaries were diseased—so that in more than half the disease was on both sides. The tendency to disease of both ovaries appears to be greater before the age of 50 than in older women. Of 52 women under 50, both ovaries were diseased in 31; 1 ovary only in 21 (59 per cent. to 40). Of 44 women above 50, both ovaries were diseased in 17 only, while 1 ovary was diseased in 27. Thus, under 50, we had both ovaries diseased in 59 per cent.; above 50, only in 38 per cent.

But it must be remembered that any conclusion drawn from post-mortem examinations would in all probability differ very widely from results observed in ovariotomy. The first series of facts shows what may be expected when ovarian disease has proceeded to its natural termination, or has only been modified by palliative treatment. The other series shows what may be expected when the patient is subjected to radical treatment before the disease has advanced to its last stages. All observation tends to the conclusion that disease begins in one ovary and advances to a considerable extent in that ovary before the other is affected, and that in about half of the cases it proceeds even to its fatal termination without any disease occurring in the opposite ovary.

If, then, in only about half of the cases where ovarian disease has reached its *latest* stage, disease of both ovaries is found, we might expect that in *earlier* stages of the disease both ovaries would be much less frequently affected; and so far as my observation has gone, this is the fact. In the 1,139 cases in which I have performed ovariotomy I only removed both ovaries in 102 cases. In a few other cases the ovary not removed presented some indications of disease in a very early stage, but not sufficient to warrant its removal.

It is not improbable that in some of the earlier cases slight disease of the opposite ovary may have been overlooked; but, making every reasonable allowance for such error, it is not probable that both ovaries will be found diseased in more than about 10 per cent. of the patients.

As to the frequency with which, after successful ovariotomy, the ovary not removed, but examined and found healthy, becomes diseased, 4 came under my notice up to the year 1872, and since then there have been 10 others.

In my 2nd case, operated on in 1858, the patient remained well for 7 years. Then disease of the opposite ovary appeared, so evidently of a malignant character that no operation was thought of, and soft cancer was found after death.

In the 3rd case, also operated on in 1858, the patient died of peritoneal cancer 10 months after operation, and disease had commenced in the remaining ovary, which was enlarged to the size of an apple.

In my 43rd case, operated on in 1862, disease of the opposite ovary came on 2 years afterwards, and was treated successfully by vaginal tapping and drainage. The patient remained well till 1872, when Dr. Sadler, of Barnsley, had again to give relief by vaginal tapping. She died in 1874.

Other cases where disease occurred in the ovary left at the first operation, and led to a second ovariotomy on the same patient, are mentioned in the next chapter.

It has been already explained how, after removing one ovarian tumour, the surgeon should examine the other ovary. In the majority of cases it is healthy and should not be disturbed. But occasionally it is more or less enlarged; and it becomes a question whether it should be removed, whether any cysts projecting from its surface should be punctured and their contents squeezed out, or whether it is more prudent to be content with the removal of one ovary, hoping that the other will never need surgical interference, or postponing that interference till after recovery from the first operation. In determining which practice to follow, the age of the patient, her conjugal condition, and the ease or difficulty with which the second operation could be performed, are the leading points for consideration.

I have little doubt that the removal of the second ovary does add somewhat to the danger of the operation. If we deduct from the 1,000, 82 cases where both ovaries were removed, this would reduce the number of single operations to 918 and the deaths to 204, with a mortality of 22·2 per cent. But as of the 82 cases of double ovariotomy 28 died, the mortality is 34·14 per cent., or more than 12 per cent. above that of the single cases. Of 139 cases since the 1,000 both ovaries were removed in 20; of these 7 died, a very large mortality compared with that where only 1 ovary was removed; but I should add that in 2 of the 7 fatal cases uterine tumours were also removed, and in 1 the death was caused by hæmorrhage from a liver cyst. This is sufficient to show that the surgeon should not remove the second ovary without good reason. I have several times been begged by patients before the operation to remove the second ovary, even if it were healthy and the risk of the operation increased, in order that they might be spared from the possibility of being again subject to similar disease; and medical men have occasionally supported this not unnatural wish of the patient. I have always replied that I should object to the removal of a healthy organ if that removal endangered the success of an operation which was clearly necessary; that the second ovary cannot be removed without some additional risk; that, as a rule, the removal of one ovary would not be followed by disease of the other; that the double operation would necessarily render the woman sterile, and that there might possibly be some consequences of the removal of both ovaries which would be objectionable if not directly prejudicial. For these reasons I am of opinion that a healthy ovary should not be removed from any woman at any age, unless Battey's operation has to be

considered. This subject will be treated in a subsequent chapter.

The amount of apparent disease in an ovary which would justify the removal of the organ may vary with the age and condition of the patient. In a woman past the age of child-bearing a small amount of apparent disease would justify removal of the ovary, whereas a surgeon should hesitate before he condemns a young woman to permanent sterility. It has been suggested that in every woman past the age of child-bearing, if one ovary has to be removed both should always be taken away, to avoid the possibility of recurrence of disease calling for a second ovariotomy. But one would hardly be justified in adding anything to the risk of a first operation on so small a probability as there is of recurrence of non-malignant disease on the other side.

Sometimes during an operation, after removal of one ovary, some slight alteration in the other may be observed, and the question of removal of the second ovary may arise. In many of my cases this question has arisen. In my 112th case of ovariotomy the left ovary was enlarged to nearly double the normal size. Two follicles, about the size of cherries, were distended by clot. These I laid open, turning out their contents. The operation was peculiar on account of the doubt as to the treatment of the left ovary. I resolved not to remove it. This operation was performed in November 1864. The patient recovered well, was married in August 1865, and is now the mother of 8 children. All the pregnancies and labours were perfectly natural.

Of the 82 cases in which both ovaries were removed at one operation, 20 were 50 years of age or more, 18 were between 40 and 50, and 31 were under 40; 43 were married, 36 single, and 3 were widows. In 1 case there were 3 ovaries.

The chief point of practical importance in double ovariotomy is the mode of dealing with the pedicle. The results, before adopting complete intra-peritoneal ligature and antiseptic treatment, were strongly in favour of the extra-peritoneal method of dealing with both pedicles; but since 1878 I have always treated both pedicles by the ligature, which has been returned and left within the abdominal cavity.

CHAPTER X

ON OVARIOTOMY PERFORMED TWICE ON THE SAME PATIENT

The first patient upon whom I performed ovariotomy, one ovary having been previously removed, had been operated on by Baker Brown 6 months before she consulted me on account of a recurrence of the disease. The paper in which I described this case was read before the Medical and Chirurgical Society in June 1863.

My next case is the first in which ovariotomy was twice successfully performed upon the same patient by the same surgeon.

I performed the first operation in the Samaritan Hospital on February 15, 1865. The patient was an unmarried schoolmistress, aged 24. She was feeble, and had a strumous appearance. The whole abdomen was occupied by an irregular tumour, in some parts of which fluctuation was perceptible. There was nothing unusual in the operation. The pedicle was 3 to 4 inches in length, extending from the left side of a long thin uterus; it was secured in a small clamp, and left outside without traction. The right ovary was felt to be healthy. About 22 pints of fluid were evacuated, and the more solid remainder of the tumour weighed about 7 pounds. The patient rallied well, and left the hospital 4 weeks after the operation.

The patient remained well for more than a year after the first operation. In August 1866, I found a semi-solid tumour of the right ovary, reaching up to the false ribs on the right side, in the centre to 2 inches above the umbilicus, and extending towards the left side half way between the umbilicus and anterior superior spine of the ilium. The uterus

was freely movable. As there was no cyst large enough to tap with any hope of affording even temporary relief, I performed ovariotomy August 30, 1866, just 18½ months after the first operation. Bearing in mind the slow and imperfect union in my former second operation, when I made the incision very near the cicatrix of the first operation, I made it in this case 1½ inch to the right of the cicatrix (which was exactly in the middle line), and carried it from 1 inch above the umbilical level downwards for 5 inches. Its lowest point was about ½ an inch higher than the level of the lowest point of the cicatrix. A thin-walled compound cyst was closely adherent all over its anterior surface, but the adhesions yielded easily. A broad thin pedicle extended about 2 inches from the right side of the uterus. The uterus was in its normal position; but the pedicle of the tumour removed at the first operation passed from the left side of the uterus and adhered firmly to the lower angle of the cicatrix in the middle line of the abdominal wall. The pedicle of the tumour about to be removed was enclosed in a broad clamp, and the tumour was cut away. Finding that there would be considerable traction on the uterus and broad ligament if the clamp were kept outside, I applied the actual cautery and burnt off the portion of cyst left above the clamp. The pedicle was allowed to sink into the pelvis. The wound was closed by silk sutures. The jellylike substance removed with the fragments of the broken-up tumour, together measured 18 pints. The tumour was a multilocular cyst, with much tubercular deposit in the walls and septa.

The progress of the patient after the second operation was quite as satisfactory as after the first. After the 2nd day all unfavourable symptoms ceased, and she returned to Lincolnshire 29 days after the operation.

Note added November 13, 1866.—'I have heard from her twice since her return home. The last letter is dated November 10, 1866. She says, "I think, upon the whole, I feel as well as I did after my first operation. My voice is stronger. I can sing the upper notes with greater facility than formerly. I can sing from A up to C natural." I was curious to have the range and power of the voice observed after the removal of both ovaries, and it could be done with unusual accuracy in this case, as the patient is a teacher of singing.'

In 1867 this patient went to reside at Brighton, and fulfilled her duties as a schoolmistress there for more than a year. I heard of her more than once as being in good health, but on June 30, 1868, I received a letter from Mr. Humphry, stating that she had died two days before, and adding, 'About a week before her death I saw her for the first time, when she had slight congestion at the bottom of one lung. In two or three days this subsided, but she seemed to get worse, great prostration, some sickness, small, quick pulse, restlessness of manner, and some fulness of abdomen leading me to fear some serious mischief about the seat of the old disease. These increased, with swelling of the left leg, which was painless, as was the abdomen, and she quickly sank. I found about a gallon of almost clear serum in the abdomen. No general adhesions. One pedicle adherent to lower end of scar in the abdominal wall, and adhesion between bowel and bladder. Uterus very small and elongated, from dragging to abdominal wall through pedicle. Clot in left iliac vein. No other sign of disease. I could only lay the attack to cold.'

The next case where I performed ovariotomy successfully twice on the same patient was my 30th case of ovariotomy. The patient was single, 50 years of age. She had been tapped 12 times, the quantity increasing and the fluid becoming thicker every time. The operation was performed on December 17, 1861. The pedicle was short, but was easily secured by a clamp about 1 inch from the right side of the uterus. On examining the left ovary, it was found atrophied, but a thin-walled single cyst, as large as an orange, was observed close to the uterus, within the folds of the left broad ligament. This was laid open by an incision and emptied. The wound was then closed, with the stump of the pedicle at the lower angle of the wound. The entire weight of the tumour was nearly 40 pounds. The progress after the operation was uninterrupted, and on December 31 the patient was convalescent.

For more than 5 years the result was satisfactory. But in November 1867, the patient returned with a cyst in the abdomen of about the size and shape of

the womb at the 6th or 7th month of pregnancy. After tapping, and 2 months of restorative treatment, the cyst being larger than before tapping, I performed the second ovariotomy on February 5, 1868. I made the incision parallel with the cicatrix over the linea alba, but $1\frac{1}{2}$ inch to the left of it, and extending about 1 inch lower. The cyst on the left side was exposed and tapped. The only adhesions were to a piece of omentum, which also adhered to the abdominal wall beneath the cicatrix and to a coil of intestine. These adhesions were easily separated. On withdrawing the empty cyst and a group of secondary cysts, the uterus was seen to be held up near the lower end of the cicatrix by the pedicle of the tumour removed in 1861. The cyst on the left side had a broad attachment behind and to the left of the uterus. There was not room to apply a cautery clamp without injury to the uterus, and I accordingly cut away the base of the cyst, tying all vessels which bled as I went on, separating the extremity of the Fallopian tube from the part of the cyst to which it adhered, and leaving a small portion of cyst wall closely adhering to the inner part of the tube and to the uterus.

The cyst weighed 15 ounces and contained 7 pints of fluid. It was a multilocular proliferous cyst with very vascular walls. The woman went on well, although nervous, feverish, and subject to palpitation, afterwards explained by the discovery that she had a large secret supply of brandy. Yet she left 28 days after operation, on March 5, 1868. She died just 8 months after the second operation. There was no post-mortem examination; the registered cause of death being 'aberration of mind and voluntary abstinence from food.' I was afterwards informed that she became quite fleshy, and able to walk 3 or 4 miles, until she began obstinately to refuse all food.

In one other case I went prepared to perform ovariotomy upon a lady whose right ovary I had previously removed; but I found the uterus and left ovary quite healthy, and a very thin-walled cyst attached only to the abdominal wall, as if it had arisen at a spot where some firm adhesions had been separated at the first operation. I emptied the cyst, laid it freely open, and saw the patient several years afterwards in good health.

My next case was an unmarried lady, 28 years of age. I performed the first operation on June 11, 1862. On opening the peritoneum, I found that the tumour was quite closely attached to the right side of the uterus; there was nothing like a pedicle. I accordingly passed the chain of an écraseur above the Fallopian tube and below the round ligament, and tightened it quite close to the uterus. I then cut away the tumour, and afterwards pared down the stump nearly to the tight chain. I then loosened the chain; there was no bleeding. So the chain was removed, the pelvis cleansed, the left ovary found to be healthy, two small pedunculated cysts of the left broad ligament twisted off, and the wound was closed by two deep and four superficial sutures of platinum wire.

The patient went out of town on June 30, with the wound quite healed, soon gained strength, was married in the summer of 1863, and a fine strong child was born in August 1864. The labour was perfectly natural.

A second child was born in February 1866, and the patient again became pregnant early in 1867. Up to this time the health had been very good, but then disease reappeared, so that she required tapping during the pregnancy. Another tapping followed, and a solid substance of considerable size could be felt on the left side. Towards the latter end of May 1868 the distension again rapidly advanced. The second operation, for removal of the second tumour, was undertaken on the 21st of June, 1869.

The incision was made parallel with, and $\frac{1}{2}$ an inch to the left of, the cicatrix of the first operation, extending from the umbilicus to a point 2 inches above the pubes. A little ascitic fluid escaped on opening the peritoneum, and a coil of intestine was seen, as well as a large piece of omentum, which adhered to the abdominal wall around the umbilical ring. On introducing the hand, and pressing the intestine and omentum upward, I brought a tumour forward and tapped a very thin transparent cyst. Two or three pints of clear serum escaped, and I then found a solid fibroid tumour to be closely attached to the upper and back part of the uterus. A coil of intestine

and a piece of omentum which adhered to the tumour were separated from it, and the tumour was drawn outward. The chain of an écraseur was then passed behind the uterus around the neck of the tumour, avoiding the right ovary and right Fallopian tube, which were healthy. The chain was slowly tightened, and the tumour pared away near the chain. One omental vessel was tied, and the ligature returned with the omentum. Some stitches were then inserted to close the upper part of the wound, the chain of the écraseur being occasionally tightened. As it cut through there was free bleeding, and some vessels were tied on the posterior surface of the body of the uterus, and close to the left Fallopian tube, which had been divided.

The uterus was again examined, and perchloride of iron was applied to part of the surface where there was some oczing. At length the wound was closed, the sutures being passed so as to include the opening at the umbilical ring, and two others beside the cicatrix, where there had been hernial protrusion.

There was some sickness during the operation, and it continued afterwards. She soon began to show signs of failing power, and died 66 hours after the operation.

At the post-mortem examination some of the small intestines were slightly adherent from recent exudation of fibrine. The uterus and other parts were sent to Dr. Wilson Fox for examination, whose report runs as follows: 'The tumour is, I believe, a fibro-sarcoma, with a large proportion of cells like organic muscular fibres, but others are mere fibre cells. Besides these, there are a great number of round and oval-shaped nuclei. The tumour has under the microscope a minutely lobed character; i.e. it is traversed by septa in all directions, and in the septa the muscular fibres, and also the fibre cells, are the most abundantly accumulated. The section is everywhere opaque, and glistening and firm; a few striæ of fatty degeneration are seen in spots only. Parts of the tumour are breaking up into a reticular structure, in the meshes of which a clear serous fluid is contained. Various cysts, from the capacity of a large walnut to that of a hazelnut, are also scattered through it, in addition to the larger ones opened before. As to whether this tumour represents a sarcoma of the ovary, I am not prepared to pronounce a positive opinion; but in some parts there are little cavities with well-defined walls, which look as if they might be the remains of the Graafian follicles, but the walls are completely changed by the fibroplastic growth, and their lining does not show any remaining distinct traces of the membrana granulosa. They appeared empty, and two or three times the size of the ordinary Graafian follicles. The amount of muscular tissue present is not, I think, enough to invalidate an ovarian origin. The general character of the tumour is unlike the fibroids of the uterus which I have seen, but I have not made these latter the objects of a sufficiently comprehensive study to be able to speak positively on this point. If the tumour is ovarian, as I am inclined to think, there would appear to be a double source of cyst formation in it—one, the liquefaction or breaking down into cavities, such as is seen in the whole class of these tumours, and the other, from enlarged and altered Graafian follicles.'

During the operation, besides the tumour, I found in the abdominal cavity a free, spheroidal body, measuring 2 inches in its long diameter, $1\frac{1}{2}$ inch in breadth, and $\frac{2}{4}$ of an inch in thickness. Its weight was 241 grains. It was semi-elastic, of dark brownish-yellow colour, and the surface was smooth and shining. It consisted entirely of fat and cholesterine crystals, and had an exceedingly delicate investment of connective tissue, with fascicles of nucleated fusiform cells and elastic fibres. This body was evidently one of the appendices epiploicæ, which had separated from its pedicle, and had remained some time free in the abdominal cavity.

During the attendance in 1862, doubt arose whether I had been right in describing the *right* ovary as having been removed at the first operation; and the second operation not only justified the doubt, but also suggested the question—which even the examination of the tumour by Dr. W. Fox did not solve—whether the tumours in either operation were really ovarian, or fibro-cystic, or fibro-sarcomatous growths, originating in the uterus and only involving the ovaries. A case such as this, which not only shows the difficulties of diagnosis encountered in the emergencies of practice, but proves how perplexing, even in the deliberate

investigations of the accomplished pathologist, some of the obscurer forms of disease may become, should tend to moderate any captiousness of criticism in matters of practical surgery, and open up the way to more minute and recondite research into the origin and forms of morbid changes.

To these 4 cases I have now to add 9 others, making 13 in which I have removed an ovarian tumour from a patient who had previously undergone the operation. In 11 of these patients I performed both the operations myself. It seems unnecessary to make a detailed report of the cases, but it may be interesting to give the dates of the first and second operations.

No.	Date of operations	Result	History or cause of death
5	Feb. 1873 June 1874	Recovered	Died Apr
6	May 1870 June 1875	Recovered	Married 1876 Well in 1881
7	April 1873 July 1876	Recovered	Intestine torn Well in 1881
8	May 1869 July 1876	Recovered	Well in 1881
9	Oct. 1872 Nov. 1876	Recovered	Well in 1881
10	Dec. 1865 Dec. 1876	Recovered	Well in 1881
11	May 1870 Feb. 1878	Recovered	Well in 1881
12	May 1875 June 1880	Recovered	Well in 1881
13	Aug. 1876 Nov. 1881	Recovered	Well in 1884

CHAPTER XI

ON THE TREATMENT OF PATIENTS AFTER OVARIOTOMY

The treatment of patients after ovariotomy may be considered under three distinct heads: first, the conditions under which the patient is placed, and the duties of the nurse; secondly, the medical treatment; and thirdly, the surgical treatment.

A large, lofty, quiet, airy room, neither too hot nor too cold; two comfortable, small, clean iron bedsteads, with hair mattresses, and light, warm bedding, so that the patient may be lifted from one to the other, and have a fresh bed every day; the personal linen so contrived that it can be changed frequently without much disturbance of the patient; the windows provided with shutters or blinds disposed so as to admit only an agreeable amount of light, or to maintain a soothing twilight; an open fire, which, with an open window, secures a fitting temperature with natural ventilation; a floor free from all woollen covering and painted or varnished to facilitate the removal of everything that could prove offensive or hurtful—these things together form a combination of favourable conditions which, important in general surgery and in the treatment of every case of severe illness, are imperatively necessary after ovariotomy. It is in attention to minute details, and by the observation of the ill-effects which follow the neglect of any of them, that the practitioner is taught their importance, and learns how much of his success depends upon careful and intelligent obedience in those who are entrusted with the care of the patient.

The duties of the nurse are to use the catheter about every six hours, or oftener if the patient desires it, in order to render any movement or muscular effort in emptying the bladder unnecessary. This should be done for 3 or 4 days; and it is often longer before a patient is able to dispense with the use of the catheter. A silver catheter seems to irritate the urethra and bladder less than an elastic instrument. Certainly, troublesome catarrh of the bladder is more frequently noticed when an elastic catheter has been used, probably because it is not so easily cleansed, and some decomposing mucus is introduced by it into the bladder. A silver instrument is more easily cleansed. This should be thoroughly done every time the instrument is used, and it should be kept in carbolised water. The nurse should also be capable of injecting into the rectum, either small quantities of food, or such doses of some opiate as may be found necessary to relieve pain. A succession of small opiates, left to the discretion of an intelligent nurse, with directions to give only enough to keep the patient free from severe pain, answer better than larger doses administered at stated inter-

vals. She should be ready to supply the patient either with warm or cold drinks, or with such light nourishment or stimulants as may be directed. Stimulants, such as brandy or champagne, must also be left to the nurse, but with explicit understanding that they are only to be used when called for by faintness, or chilliness, or some sign of exhaustion. Very little food is required during the first 3 days after the operation, but there should always be at hand a supply of some light nourishment, such as well-made barley-water, toast and water, thin gruel, water arrowroot, bread and milk, chicken broth or beef tea. These the patient may take almost as freely as she pleases, provided she is not sick. Should sickness be troublesome, a little brandy in iced soda-water, or champagne iced, will probably relieve it; but it is often only a sign of weakness, and is then best met by enemas of beef-tea, either with or without egg and brandy, thrown into the rectum, in quantities of not more than 2 ounces, at short intervals. Before giving the injection, and at any time when flatulence is distressing a patient, the nurse should introduce an elastic tube or the injection-pipe some 2 or 3 inches into the rectum, in order that flatus may escape without straining effort, and also to allow of the outflow of any previously injected and unabsorbed food. The nurse should be able to note variations of the pulse, to take and record temperature observations with the thermometer, at stated hours, or on the occurrence of any febrile symptoms. In cases of drainage, a nurse who can be trusted to attend to the cleanliness of the tube, to draw off accumulations of fluid, or to inject antiseptic solutions, is an exceptionally good one. The nurse should watch the urine of the patient, and should be directed to give the patient every 2 or 3 hours some lithia water, or a mixture of the citrates of potash and lithia, as soon as it becomes scanty or concentrated, depositing urates on cooling.

Beyond this administration of lithia and potash, and opiates in sufficient quantity to relieve pain, *medical treatment* may be said to consist in doing no harm, provided the case go on without any serious complication. But if peritonitis, either of the sthenic or traumatic character, or of the septic variety, occur, the fever accompanying either form of inflammation must be watched; and if the temperature of the body as shown by the thermometer rises considerably above the normal standard, means must be taken with the object of lowering the temperature. Packing the arms and legs in wet towels—even the cold bath—has been occasionally used in cases of hyperpyrexia, but generally icing the head continuously is far less disturbing to the patient, and even more efficacious. I have tried the cushions made of tubes for iced water, introduced by Dr. Roberts, of Manchester, and icebags for the neck, after Dr. Richardson—but prefer Mr. Thornton's ice-cap for the head to any other arrangement. Before antiseptics, the head was kept cool for a day or two in about half the cases. Since antiseptics, I have scarcely ever found it necessary.

The bowels are kept quiet after the operation; and as long as the patient feels comfortable, their action needs not be brought on, even if they do not act for 10 days or more. I have known the bowels to be 19 days without acting, and then act naturally without any painful effort. An enema of warm water or a dose of castor oil will bring on their action if not spontaneous. Hard fæcal masses in the rectum may cause tenesmus, keep up a spurious diarrhœa, and thus render the patient uncomfortable. Their presence will be discovered by digital examination. They should be broken up with the finger or a spoon, and the bowels afterwards cleared by injecting warm water. If the first motion fatigues the patient and renders her restless, it will be advisable to have it followed by an opiate enema. Vomiting is often a troublesome symptom, less so when methylene has been used than after chloroform. It is sometimes relieved by giving small pieces of ice to suck, or to swallow as ice pills; sometimes by draughts of hot water. But this is sometimes dangerous by leading to accumulations of large quantities of fluid in the stomach. If this accumulation and consequent faintness are observed, it may be necessary to empty the stomach by the stomach-pump. Of all medicines, I have found 15-grain doses of bromide of potassium in 2 ounces of water the most useful. Next to that, 3 to 5 drops of prussic acid.

Flatulence, often a very troublesome symptom, may be relieved by passing the elastic tube of an enema apparatus up

the rectum. An enema of 5 grains of quinine in 1 ounce of water or beef-tea, with or without a few drops of laudanum, or ½ an ounce of port-wine, repeated every 4 hours, has often relieved flatulence by restoring the tone of the muscular coat of the intestines, and occasionally Faradisation has proved useful in the same way. A few drops of chloric ether and salvolatile sometimes give relief, and tincture of nux vomica has appeared to be of use in some cases.

Surgical treatment.—The various conditions following ovariotomy which may call for surgical treatment may be arranged in order, commencing with the wound in the abdominal wall and the separation of the pedicle; next collections of serum, blood, or pus in some part of the peritoneal cavity; and thirdly adhesions between the intestine and the pedicle, or the abdominal wall, leading to intestinal obstruction.

Unless the abdominal wall is œdematous, or the dressing is moistened, it is better not to disturb the bandage or plaster until the seventh day after operation. And then it is not necessary to raise the plaster from the sides of the abdomen: it should be raised and divided with scissors 2 or 3 inches on one side of the wound, then raised and divided on the other side. In this way the wound may be uncovered without disturbing the patient. After removing the gauze or wool, the plaster left on either side is used as splints, and drawn together by new plaster above and below the wound so as to take off all tension from the wound as the stitches are removed. As a rule, union takes place without any suppuration. Quite exceptionally a little pus will exude from one or more of the points of suture. This is not of much consequence. Indeed, since antiseptics it is very rare to see even a single drop of pus. Three or four times, before the antiseptic period, I have seen considerable collections of pus in the abdominal wall, almost always in very fat patients. In such cases care must be taken to avoid any dressing which would interfere with the free escape of the pus. A pad of boracic cotton should be placed over the wound, and support given by strips of plaster, which draw up the side pieces or splints. Kœberlé uses cotton threads steeped in collodion with the same object.

In every case after removal of the sutures, the abdomen should be supported by adhesive plaster for at least a fortnight, or until the wound is firmly agglutinated. Tympanites, hiccup, and vomiting might separate the edges of a wound which had united fairly well, if these edges were not well supported. In a few cases I have seen more or less reopening of the wound; in 2 the sutures were removed too early, and the abdominal walls were not supported by plaster; in other 2 cases there was pyæmia or septicæmia, and the plastic process was slow on account of the state of the blood; in other 2 cases the accident was caused by violent cough on the 7th or 8th day, and in one by sneezing a day or two after the stitches had been removed. These three patients recovered, the septicæmic cases died. I have also seen other cases where partial reopening of the wound has appeared to do good by admitting of the escape of serum. In all, the stitches were replaced as soon as I was aware of the occurrence. In two cases there was escape of intestines and some difficulty in replacing them, but the accident scarcely retarded recovery.

Unless the pedicle is very short, if a clamp has been used it lies across the lower part of the wound, without any depression of the abdominal wall, and the patient is quite unconscious of its presence. Sometimes, with a very short pedicle, the clamp and the integuments have been drawn almost down to the sacrum, even then, without much complaint from the patient. There has sometimes been protrusion of the pedicle behind the clamp, separating the lower edges of the wound. When this occurs, the lowest stitch should be removed, as the protrusion is due to obstructed return of blood through the veins of the pedicle. Two or three times the protrusion has been so great that I have passed a pin through the pedicle behind the clamp, tied a ligature below the pin, and cut away both clamp and pedicle; but this was seldom necessary, as the swelling subsided soon after the removal of the compression caused by the too tight stitch. The clamp and the portion of pedicle compressed by it generally fell off from the 7th to the 10th day, sometimes as early as 3 or 4 days, and sometimes not for 15 or more. It is important not to remove the clamp too soon, especially if the pedicle is short, as the newly formed adhesions between the pedicle and

the abdominal wall might give way, and the pedicle sink into the peritoneal cavity, possibly giving rise to septic peritonitis and death, and probably leaving an opening which, after healing of the skin, would admit of the easy production of a ventral hernia. But when the clamp is only held by a few shreds of dead tissue, it may be removed. A little ulceration of integument from pressure of the clamp should not lead to the premature removal of the clamp, as this is of far less consequence than the risk of removing the clamp too soon.

The delay in the union at the lower angle of the wound, where the remains of the pedicle are fixed in clamp cases, may protract the complete cicatrisation to the 3rd or 4th week, but this is of little consequence, and need not interfere with the movement of the patient. Where the patient has been treated by one or other of the intra-peritoneal methods, union by the first intention along the whole length of the incision is usually complete.

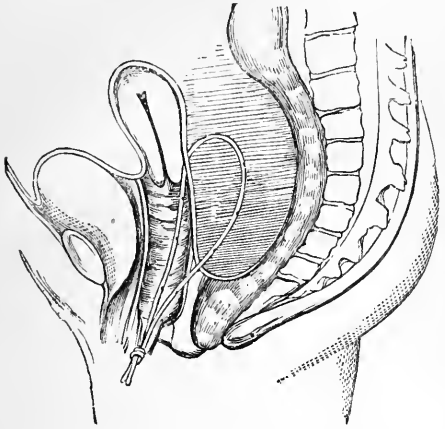
When bad symptoms follow ovariotomy —pain, vomiting, fever with abdominal distension—the surgeon should suspect that some fluid, either serum, blood, or pus, is collecting in the peritoneal cavity. It may collect in such quantity as to give rise to sensible fluctuation from one side of the abdomen to the other. Or, in smaller quantity, it may gravitate to the bottom of Douglas's space, and form a tense swelling behind the uterus, easily felt through the vagina, although there may be no free fluid perceptible in the abdominal cavity. If the pedicle has been treated by the uncut ligature, the ends of the ligature passing through the wound then serve as drainage conductors, and a very free discharge of fluid may go on for several days. Kœberlé prepares for drainage by introducing strong perforated glass tubes, and, by the aid of a syringe fitted to the tubes, he withdraws fluid several times daily. Peaslee advocated and adopted with success this system of drainage, with the addition of repeated washings out of the peritoneum with warm water and disinfecting solutions. In a few bad cases I have followed this practice, but never with success.

In most of the cases reported by Peaslee as treated with peritoneal injections, the pedicle was dealt with after the oldest method: that is, it was transfixed, each half was tied, and the ends of the ligatures were allowed to hang out of the wound. In one case, the ligatures were brought out through a vaginal canula. In all, the convalescence was very tedious, and 3 had septicæmia. The most remarkable of the whole, as regards the treatment, was that in which 130 injections were made into the peritoneal cavity in 78 days. The last ligature came away, and pus ceased to be secreted, on the 94th day after operation.

Whenever fluid can be detected by vaginal examination in the neighbourhood of the uterus it is usually in such quantity that it must be removed. This is done either by a straight or curved trocar, over which an elastic catheter is fixed, instead of a canula. Or, by a trocar still more curved, a piece of drainage-tube may be inserted and fastened, as shown in the next cut. I introduced such a tube in the following case, where it led to free discharge, which was followed by complete recovery.

I performed ovariotomy on a girl, 18 years of age, in the Samaritan Hospital on June 13, 1864. Long and very firm adhesions anteriorly and in the right iliac fossa, and a very extensive surface of adherent omentum, were separated by the hand with some difficulty, and a close adhesion to the fundus of the bladder was separated by very careful dissection. The ovary appeared normal, while the tumour was attached to its external angle by a narrow pedicle, about 1 inch in length. The ovary was, however, removed with the tumour. A small pedicle was secured close to the uterus by a silk ligature, which was cut off short and returned. The stitches were removed 44 hours after operation, the wound being perfectly united. On the 3rd day after operation some sharp pain came on, which became easier after a uterine discharge like menstruation appeared. She continued doing well till the 9th day, when she was found with dry tongue, dilated pupils, flushed face, and drowsiness. I examined by the vagina and rectum, and, detecting fluid between them, made a puncture by a trocar, and let out 5 ounces of dark bloody serum which had a putrid ammoniacal odour. The pulse sank from 112 to 95 and 92, but mucous diarrhœa came on, and the typhoid condition was aggravated next day. As the discharge from the trocar puncture had ceased, and examination detected fluid

still in the recto-vaginal space, I made another opening into it, and evacuated 10 ounces of fluid still more putrid than that of the day before, and containing pus. I then carried on the trocar through the opening made the day before, and drew a drainage-tube through the canula before withdrawing it. The tube was then tied and left fixed, as shown in the diagram. I took great care that it should



pass through the lowest point where the peritoneum is reflected from the rectum to the vagina. Very free discharge came through the tube for several days, and the general condition rapidly improved. The tube was removed on July 1, and convalescence was rapid.

The result of my experience is, that the danger of puncture has been exaggerated; that the benefit of the evacuation of fluid is very marked; and that any danger arises from too early closing of the opening, not from the opening having been made. Where it is not easy to pass a drainage-tube, or where it is desired to use antiseptic injections as well as to drain, it is better to leave a silver canula in Douglas's pouch, and to keep it there by the spring of double silver wire as shown in the drawing at page 44. It passes out through the vagina, and injections may easily be thrown through it. But this is a troublesome detail of after-treatment which has become extremely rare since the adoption of antiseptics.

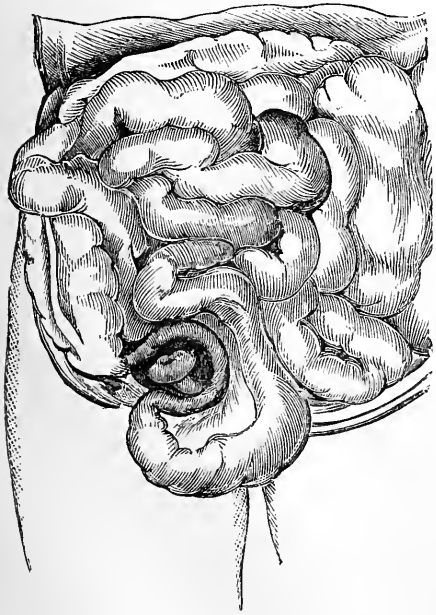
The most alarming symptoms which occur after ovariotomy are those which depend upon obstructed intestine. I heard of one case which has never been recorded, where a coil of intestine slipped through one of the loops of wire used as sutures for the wound, and was tightly compressed when the wire was fastened. In a published case, there is very little doubt that a fæcal fistula was caused by perforation of intestine with the stitch closing the wound. In one of my early cases, a coil of intestine was compressed between the pedicle and the abdominal wall, and I have seen others since where the same accident would have happened if I had not been on my guard. After the intra-peritoneal methods of dealing with the pedicle by ligature and by cautery, I have seen fatal obstruction of the intestine caused by adhesion of coils of intestine around the divided end of the pedicle at such sharp angles that the canal was quite closed; and I have seen adhesion of intestine to a clamped pedicle lead in the same way to obstruction. The following case illustrates the course of the symptoms when this dangerous complication presents itself:

A single woman, 35 years old, was admitted to hospital in March 1867. The whole abdomen was filled by a multilocular ovarian cyst. The uterus was healthy, and its mobility free. Ovariotomy was performed on March 27. A pedicle, 2 to 3 inches broad at its narrowest part, and about one-third of an inch thick, connected the base of the tumour closely to the right side of a small hard uterus, of irregular shape from a fibroid nodular outgrowth. A cautery clamp was applied, and the pedicle divided by hot irons. On opening the clamp, the compressed and seared pedicle appeared at first quite secure. But as the pedicle was slowly separating from the blade of the clamp to which it adhered, three vessels bled freely. These were tied, and then, as there was some oozing of blood all along the line of eschar, I transfixed the pedicle close to the uterus, tied the pedicle in two halves, and allowed it to sink into the abdomen, after cutting off the ends of the ligature short. The left ovary was healthy.

The state of the patient after operation was unsatisfactory from the first, but there was not much pain. Some sickness on the day after operation increased on the 2nd day, and the abdomen became tympanitic. On the 3rd and 4th days the vomiting continued, a great deal of dark-green or coffee-coloured fluid being thrown up. A free fluid motion was followed on the 5th and 6th days by some

improvement, although the vomiting of large quantities of greenish fluid continued. On the 7th morning the patient appeared much better; but in the evening the pulse was 160, and she appeared almost moribund. Five grains of quinine were given every 3 hours by mouth and rectum. In 16 hours 35 grains had been given, and on the 8th day the pulse had fallen to 120. In the next 10 days she improved in many respects. There was no vomiting, but she suffered at times with abdominal pain and much flatulence. On the 19th day she appeared remarkably well; but at night, after a free watery motion, she suddenly became faint and sick, and died on the morning of the 20th day.

The wound was found firmly united. There were scarcely any traces of general peritonitis. No intestine was adherent near the wound, but one coil slightly adhered above the umbilicus. The uterus was small, and had a fibroid nodule the size of a marble projecting from its fundus. The left ovary was healthy. The pedicle of the tumour of the right ovary was closely surrounded—as shown in the accompanying engraving—by an

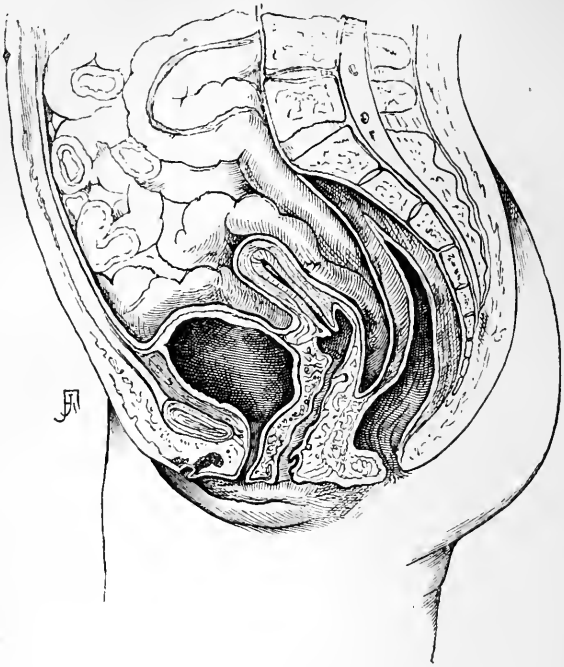


adhering coil of the ileum just before it enters the cæcum. About 1 ounce of pus was circumscribed by this adhering intestine around the end of the pedicle, so that none of the pus entered the peritoneal cavity. The canal of the adhering coil of intestine was almost completely obstructed, partly by the sharp curves at which it was fixed, and partly by the contraction of the adhering portion, the intestine above being much distended. There was neither blood, lymph, nor serum in the peritoneal cavity, nor could any tubercular deposit be found.

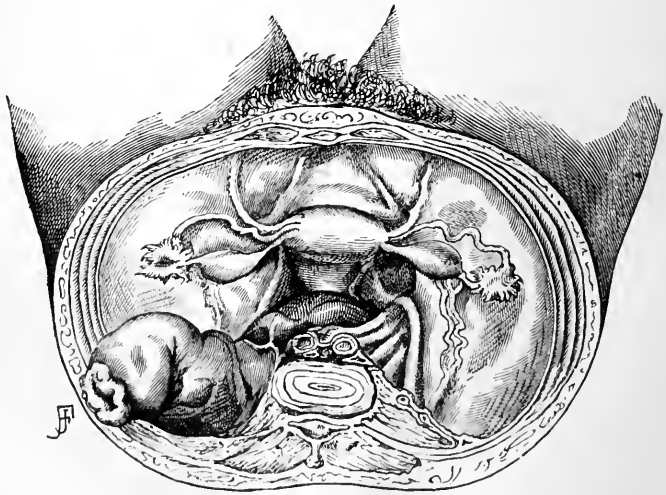
In all these cases the symptoms are exactly those of strangulated hernia. They may be relieved by opium or belladonna, but are almost certainly fatal if the obstruction cannot be overcome. More than once I have reopened the abdomen and separated adhering intestine from the abdominal wall and pedicle, with temporary relief, but new adhesions followed and ultimately death. I have seen several cases where symptoms of obstruction have gradually disappeared, and this has led me to wait too long in other cases before reopening the wound and searching for the seat of obstruction. In one case I might easily have saved life by separating a mere film of adhesion close to the wound, which held a piece of small intestine as sharply as a ligature. The preparation is in the Museum of the College of Surgeons.

Two woodcuts on the next page serve to make clear a point in anatomy which, from being overlooked or forgotten, has often led to difficulties in diagnosis and sometimes to dangerous proposals or mischievous practice. It will be seen by the representation of the perpendicular section of the abdomen, pelvis, and their contents, how under certain circumstances Douglas's pouch may become distended by fluid or by a mass of intestines gravitating into it. To be able to make sure of the nature of the tumefaction thus caused, and perceived during vaginal examination, requires tact and experience, and I have not been surprised sometimes to hear most erroneous speculations about it and to find myself consulted as to operative measures for its relief, under what was supposed to be the most urgent necessity. But a study of the relations of the parts will show how the presence of small intestines filled with fæcal matter and falling low down into Douglas's pouch between the uterus and rectum may simulate abscess or hæmatocele. The drawing also explains what a scope, when the expansion of the pouch has once begun, the space offers for the enlargement of a cystic tumour in that direction, and how by remaining

for some time undisturbed it may so model itself to the form of the pelvis and to the outline of the organs in it, as to be raised with difficulty and so give cause to fear the presence of serious attachments. All this explains one cause of obstructed



intestine which has hitherto escaped notice. Adhesion of coils of intestine to the pedicle, to the abdominal wall, or to neighbouring coils of intestine, at such sharp curves or angles as to close the canal have been referred to; but the fact that this adhesion may take place low down in the pelvis at the bottom of the



recto-uterine pouch has not been mentioned. Yet, it is not very rare, and, though recognisable when understood, it may be mistaken for abscess or hæmatocele. The first of the above drawings shows how in most adults some portion of the

small intestines sinks down in the normal condition of parts between the uterus and the rectum. After ovariotomy, especially when the lower part of the ovarian tumour has pushed the uterus upwards and forwards, a considerable space is left between the rectum and uterus, and into this the small intestines fall down. I have often found them there when sponging out the pelvis. Now, supposing them to be more or less firmly fixed there by effused lymph, it is very probable that some obstruction may follow, and that a considerable swelling may be discovered behind the uterus on examining by the vagina. Rectal examination at once shows that it is between the rectum and the uterus, and probably that it is more towards the right than the left side. A glance at the second of these woodcuts shows why this is so. The rectum, containing fæces, fluid, or gas, occupies the left side before it reaches the middle line, and there is more vacant space towards the right of Douglas's pouch to admit the small intestines. There they may adhere and form a considerable swelling.

Sometimes, long after recovery, more or less complete obstruction of intestine is followed by the formation of a fæcal fistula. Such cases are recorded by Lyon of Glasgow, Keith, and Bryant. Once the same thing happened in a patient of my own. In Lyon's case the operation was performed in February 1866, 'easily and favourably.' Hiccup and severe vomiting were present for a few days, and it was afterwards found that union of the edges of the wound was imperfect. A portion of intestine was to be seen adherent at the bottom of the wound. Pinlike perforations took place in this, and gave issue to fæcal matter and offensive gas. Various means were taken to obtain healing, but in August 1867 the wound, or rather the small exposed portion of perforated intestine, remained unchanged.

Dr. Keith operated on a patient in whom at the end of 6 weeks a pelvic abscess formed and pointed a little above Poupart's ligament. Some months afterwards there was a sudden escape of coagulated blood from the rectum, followed by a free discharge of pus from the opening in the groin. Fæcal matter soon made its appearance and continued to flow till July, when the fistula finally closed. This is the only case of the kind which has fallen to Dr. Keith, and it was also the only one in which at the time he published the case he had returned the pedicle with the ligatures into the abdomen after ovariotomy.

Mr. Bryant's was a case of successful ovariotomy in 1867. The pedicle was transfixed and tied with whipcord; the ends of the ligatures being cut off they were allowed to sink into the abdomen with the pedicle. These ligatures were discharged some months afterwards through an artificial anus at the lower part of the abdominal wound, which in the end healed up completely.

The operation in my case was performed on March 10, 1864; the patient was 57 years of age. A large multilocular cyst of the left ovary was removed. The pedicle was returned into the abdomen with the ligatures, the ends of which were cut off short, close to the knots. A portion of the cyst adhered so firmly in the left iliac fossa that it could not be separated, and it was left adherent, after transfixing and tying it, leaving the ends of the ligature hanging out of the lower angle of the wound. The patient recovered. But 5 weeks after the operation the ligatures still kept the lower part of the wound open, a little discharge daily escaping beside them. On May 31 a ligature came away, the discharge gradually lessened, and the patient considered herself to be well. In May 1865 there was increase of discharge from the sinus attended with uneasiness, but not with severe pain, the odour of the discharge being offensive —not putrid, but faint or albuminous. Deep in the left iliac region was a general state of solidity of the parts, as contrasted with the opposite side.

It should be remembered that, although the ligature which had been left hanging out through the wound in the abdominal wall had come away in May 1864, there was no proof that the ligatures tied on the pedicle, and cut off short, had come away. It was thought they might be present and keeping up irritation.

After this the discharge became more abundant and decidedly fæcal, varying in quantity from day to day. But no solid fæces ever passed. She gradually became weaker, and died December 20, 1865, about 20 months after ovariotomy.

I am indebted to Mr. T. P. Teale for a report of the post-mortem examination. 'The fistulous opening on the surface of the abdomen was large enough to admit,

the tip of the little finger. Within the abdomen it was so dilated as to admit a middle finger at least. On opening the abdomen we found the edge of the omentum adherent to the wall at the level of the wound, a coil of small intestines sealing the wound above the fistula, which latter was at the lower extremity of the wound. A small part of the small intestine, the sigmoid flexure, and the rectum were matted together around the fistula and the left corner of the uterus. Close to the left side of the uterus was a mass, almost spongy and pedunculated, which projected towards the rectum. In the centre of the mass was a large suppurating cavity, which communicated with the fistula and with the rectum by two large openings. The cavity extended for some distance between the uterus and the rectum. It passed towards the right side behind the lower part of the uterus; downwards by the side of the rectum, and forwards as far as the femoral ring. No trace of any ligature could be found. The right ovary was healthy.'

This case, and others, as I have before stated, influenced me in favour of the extra-peritoneal treatment of the pedicle. The formation of a sort of canal or sinus by the adhesion together of folds of omentum or coils of intestine, in such a manner as to enclose the ligature and shut it off from the peritoneal cavity, occurs, I believe, when the ends of the ligature are not cut off. If the patient recover, one might expect more or less obstruction of intestine to follow such adhesions; and at page 111 is a drawing of a case where such obstruction was proved. When the ends of the ligature are cut off and the pedicle returned, we know that a similar adhesion of intestine sometimes takes place around the end of the pedicle; and that in some cases pus has been circumscribed in this manner, until at length it has found an outlet, either through the abdominal wall, the vagina, or intestine. The observation of cases of this kind led me to believe that the clamp, or some other extra-peritoneal method, was not only successful as regards the immediate result of the operation, but still more so if we looked to the subsequent health of the patient. Patients who recovered after the extra-peritoneal treatment of the pedicle, as a rule soon regained health. So do those who recover after the intra-peritoneal treatment. But some of them, sooner or later, suffer from chronic suppuration, hæmatocele, or fæcal fistula; or, perhaps without any definite local ailment, are many months before they become strong and well. This, however, must be considerably modified by what has been observed since the use of antiseptics; for in the 6 years since I have combined the antiseptic and intra-peritoneal methods, I can record rapid and complete recovery as the rule, and have not noted one case either of chronic suppuration or fæcal fistula, and only one of hæmatocele, and that doubtful.

TETANUS

If my own experience of 4 cases in 1,139 cases of completed ovariotomy may be taken as any guide in estimating the frequency of tetanus after ovariotomy, we might say that it occurred once in from 250 to 300 cases. And this estimate is supported by the fact that the 300 cases collected by Dr. Lyman with a view to ascertain the causes of death furnished only 1 case of tetanus. Olshausen gives a table of 20 cases of tetanus after ovariotomy, and some particulars of 4 others, only 1 of which (and that in my own practice) recovered. It is remarkable that Stilling lost 7 patients from this complication out of a total of 29.

It is curious that, of the 4 cases of tetanus which have occurred in my practice, 3 showed themselves very early—namely, the 9th, the 12th, and the 35th cases—and I did not see another till the 898th; a run of more than 850 ovariotomies without a sign of tetanus. I have not seen 1 in the last 241 cases. The first 2 cases were in October 1859. The 3rd did not appear till May 1862, at which time several other deaths from tetanus were registered in London, 2 having followed the simple operation of tapping for hydrocele. From May 1862 till June 1878, or 16 years, I saw not a single case of tetanus, nor have I since. Among all my operations for the removal of uterine tumours, ovariotomy twice on the same patient, incomplete operations and exploratory incisions, there was not one case of tetanus. Four cases of tetanus following ovariotomy are all I have to record, and this is in the proportion of less than 1 in 300 for all gastrotomy operations. I must certainly have tapped ovarian cysts 1,000 times. I have re-

moved a great many tumours of the breast and from other parts of the body every year; and I have performed a large number of plastic operations, such as closing vesico-vaginal fistulæ and restoring ruptured perineum, tetanus occurring only once. Then it followed the operation for ruptured perineum. In this case, and in 3 out of the 4 where it happened after ovariotomy, the patients themselves attributed the access of the symptoms to a chill. In the perineal case it was very remarkable, as the premonitory stiffness and spasms appeared soon after the removal of the patient's bed to a spot immediately beneath an open ventilating shaft. In 1 of the ovariotomy cases no note has been made as to chill; but in the 3 others it was distinctly observed that the tetanic symptoms came on after an exposure to a draught of cold air when the patients were incautiously uncovered. As preventive treatment, the necessity of protecting women after operation from currents of cold air, or chill in any way, is clearly shown. In regard to curative treatment, it is interesting to state that the only case of the 29 collected by Olshausen which recovered was that which I treated with woorara. Any one wishing to follow out this subject may refer to a paper of mine read at the Medico-Chirurgical Society in November 1859, and published in the Proceedings. In the other cases chloroform was given freely, woorara was again tried, but without any apparent good result, and opium was used. All treatment, however, was as ineffectual as it is generally found to be, except in the very chronic cases. In 1 case I excised the remnant of the exposed pedicle and a portion of omentum which had been tied and brought out through the wound; hoping that, as injured nerves in the pedicle might be the origin of some injurious reflex action, when the cause of the mischief was taken away there would be some mitigation of the symptoms. Olshausen attributes the high mortality which he has tabulated partly to the irritation of hare-lip pins, but the greater proportion of it to insufficient tightness of the clamp, indicated by secondary hæmorrhage, so that the nerves of the pedicle were not so thoroughly crushed as to render them powerless in exciting marked reflex action. Messrs. Harris and Doran recently examined the spinal cord after the death of a woman in the Samaritan Hospital, and in their report to the Pathological Society state that they only found appearances which are seen after other diseases, such as exudations, dilated vessels, want of symmetry, and exuberant proliferation in the central canal; and they conclude that the clinical symptoms do not encourage us in the expectation of finding any specific change in the cord, though it is unquestionably the structure partly, if not chiefly, at fault. Here there was no apparent local morbid action, and, so far as my own cases are concerned, I have no reason to believe that any pathological condition connected with the operation had anything more to do with the disease than as giving the same predisposition which would come from a common wound.

CHAPTER XII

OVARIOTOMY DURING PREGNANCY

Ovarian tumours may not only be mistaken for pregnancy when they exist independently, but they are often complicated by its occurrence even in advanced stages of their growth. And though the diagnosis of this condition is generally to be made out by the usual order of examination, yet the complication may be revealed only at the time of the operation. Out of these circumstances several very important practical questions arise.

It may be asked, in the first place, whether in such a case it would be necessary to interfere at all, under the assumption that pregnancy and ovarian disease might go on together, and serious trouble arise only in a small percentage of cases. The early induction of premature labour has also been advocated on the grounds that rupture of the cyst, or its gangrene from rotation of the pedicle, might occur under the pressure of the

enlarging uterus, while relief has sometimes followed spontaneous premature labour. Some practitioners, again, have declared themselves in favour of tapping the ovarian cyst, rather than inducing premature labour, thus anticipating the dangers of rupture or gangrene of the cyst without sacrificing the child. And then comes the triple question, in reference to ovariotomy, whether it should be performed at all during the existence of pregnancy; whether, if done, it should be supplemented by the Cæsarean section, or Porro's operation; and thirdly, whether if, during ovariotomy, the uterus should give way or be accidentally opened, its contents should be cleared out, or the parts left to themselves, or Porro's operation be performed.

These questions are of such vital importance that I will endeavour to arrive at some general principles or useful rules of practice by the consideration of a series of cases in which the several difficulties presented themselves, and will first examine the assertion that no treatment at all is called for; that ovarian disease and pregnancy may, as a rule, be allowed to progress together without interference. I might support this doctrine by the fact that I knew one woman who, during the slow progress of an enlarging ovarian cyst, went through 5 pregnancies, bore 5 living children without unusual difficulty, although the cyst had never been tapped, nor had labour ever been prematurely or artificially induced. And by the fact that in another case where I performed ovariotomy successfully 15 months after the birth of twins, the patient had begun to enlarge 6 months before marriage, and had only suffered from her excessive size during this pregnancy; and by the fact that a patient, upon whom I performed ovariotomy with success in the 4th month of pregnancy, after rupture of the cyst and peritonitis, had borne 6 living children during the progress of the cyst before its rupture. But I must regard these cases as exceptional, for I can only remember one other case where pregnancy complicated with ovarian disease has gone on to its natural termination in the birth of a living child; or where, in consequence of non-interference, great suffering has not arisen during or after labour, or very grave danger from rupture or rotation of the cyst; or where it has not been necessary to guard against threatening danger, and either to tap the cyst, to induce premature labour, or to perform ovariotomy.

In the first 3 cases which I now proceed to narrate, death followed the spontaneous rupture of an ovarian cyst in or before the 7th month of pregnancy.

Case 1.—In July 1864, I saw a lady, who with the usual symptoms of early pregnancy had a hard, irregular tumour, in the right flank. The uterus was pushed a little over to the left side, and the movements of a child were distinctly felt; while on the right, not crossing the median line, an elastic tumour extended upwards beneath the false ribs. I suggested that if premature labour did not come on, this tumour should be punctured. In September there was an attack of peritonitis, and she was believed to be in labour. The membranes protruding, they were ruptured, and some hours afterwards a female child was born, which lived 24 hours. The symptoms of peritonitis continued, and the patient died 4 days after the delivery.

After death there was found a very large cyst of the right ovary, occupying the whole of the right side of the abdomen, and extending 4 inches to the left of the median line. It was flaccid, as if partially emptied, and a large quantity of bloody serous fluid lay in the lower part of the abdominal cavity. The pedicle, $1\frac{1}{2}$ inch long, was twisted, and the walls of the cyst were infiltrated with blood. Within the cyst there was much bloody serum with several very firm clots. Some of the contents of the cyst had evidently escaped through an opening in a very thin part of the cyst wall posteriorly, and had, no doubt, caused the peritonitis which proved fatal.

Case 2.—In May 1868, a lady in the 5th month of pregnancy was also suffering from an ovarian tumour, which had been discovered by her husband on the night of marriage in October 1866. From the time of marriage, the tumour evidently but slowly increased in size, and was the seat of frequent darting pains. Eight months after marriage she became pregnant, miscarried 6 weeks after conception, and recovered without any unfavourable symptom. From this time till the end of 1867 there was no decided

increase nor other change in the tumour. Then a second pregnancy occurred. She began to suffer intense pain in the tumour, and became restless and desponding. It was in the 5th month of this second pregnancy that I saw her, and found an ovarian cyst as large as an adult head above and to the right of the uterus. At that time there was no very great suffering, but I advised that the cyst should be tapped if relief was called for. At about the 6th month premature labour came on spontaneously, and she was delivered of a dead child. From the period of her delivery many of her symptoms subsided. But after about a week she began to complain of more pain in the tumour, and it increased rapidly in size; when one morning, after turning somewhat suddenly in bed, she cried out that something had broken inside, and died almost instantly. No post-mortem examination was made, but the abdomen was found to be perfectly flaccid. Not a trace of the tumour could be felt.

Case 3.—On January 16, 1869, I was consulted by a lady 24 years of age, who had been married about 9 months. She was supposed to be pregnant, and an ovarian tumour had been recognised in the left side 4 years before. The abdomen had gradually increased in size. I could distinctly trace the boundaries of 3 tumours, or separable portions of 1 tumour—one central, extending upwards half way from the pubes to the umbilicus; one on the left side, extending into the left flank and reaching about 1 inch above the umbilicus; and one on the right side, extending nearly to the false ribs. The central tumour felt exactly like a pregnant uterus. The tumours to the right and left were not fluctuating, but they felt softer than fibroid tumours of the uterus usually do. The cervix uteri was shortened and softened, strongly supporting the belief in the pregnancy. But no sound of fœtal heart nor placental murmur could be detected. To the left of the cervix, projecting towards the bladder, a hard nodulated tumour, as large as 3 or 4 walnuts, closely connected with the body of the uterus, could be felt. This, I felt sure, was a fibroid outgrowth from the uterus, and I made a diagram illustrating my diagnosis of pregnancy with a small hard fibroid outgrowth from the body of the uterus, and two softer tumours, which might be either ovarian tumours or soft uterine fibroids; and I suggested the propriety of inducing premature labour, as I did not think that tapping could lead to any considerable diminution in the size of either of the tumours.

A fortnight after this advice was given the fœtal heart was distinctly heard. This was on January 29. On February 8, at 4 in the morning, she awoke after 3 hours' sleep, complained of pain, fell back, and died. There was no opportunity of making a post-mortem examination, but there could be no doubt about the bursting of an ovarian cyst.

Cases 4 *and* 5.—It is unnecessary to detail the particulars of these cases, the simple facts being that two patients who were pregnant had also large ovarian cysts, which I thought should be emptied by tapping, but my advice was not followed. Both women suffered excessively from distension, had lingering labours and still-born children. In both ovariotomy was performed a few weeks after delivery. successfully in one, with a fatal result in the other.

I have also notes of 5 cases of patients whom I have tapped during pregnancy, 1 of them three times, 1 twice, and 3 once. In all these women great relief was afforded by the tapping, no ill effect of any kind was observed to follow it, and in all cases the children were born alive after labours of moderate duration. One of these cases is of sufficient interest to deserve a short report.

Case 6.—In November 1865 I performed ovariotomy with a successful result upon a married woman, 40 years of age, 4 months after the birth of a living child. I had tapped this woman 2 months before her delivery, at which time the abdomen was greatly distended, and nothing could be detected except a very large ovarian cyst, nor could the patient believe that she was pregnant. But the cervix uteri was found to be short and velvety, and *ballottement* was very distinct. After the removal of 18 pints of fluid, the enlarged uterus was felt nearly up to the umbilicus, the collapsed cyst to the left, and the fœtal heart was heard below and to the left of the umbilicus. Immediate relief followed the tapping. A healthy child was born on July 20, at the full term of pregnancy. The cyst refilled, and I removed it in the Samaritan

Hospital on November 29, 1865. The patient made an excellent recovery, and had another child in September, 1867. I heard from her in November, 1881, as being quite well.

As I published a very full report of the following case in the 'Medical Times and Gazette' of September 30, 1865, I need not do more now than point out its bearing upon the question of the performance of ovariotomy during pregnancy. In this case I entirely overlooked the coexistence of pregnancy with ovarian disease, and after the removal of an adherent multilocular cyst of the left ovary, weighing about 28 pounds, I felt what I thought was a cyst of the right ovary, tapped it, and then found that it was the gravid uterus. As this stage of the operation is of some importance in the history of the Cæsarean section, being, I believe, the first case in which the opening in the uterine wall was closed by sutures, I quote the following passage from the report published at the time:

'Some 2 or 3 pints of bloody fluid having escaped through the canula, the tumour became much less tense; and on bringing it up to the surface I saw the Fallopian tube passing from its upper part towards the left side, and knew at once that I had punctured the uterus. On withdrawing the canula, a soft, spongy, bleeding mass protruded, and on putting in my finger to push this back and examine the uterine cavity, the anterior wall of the uterus—which was very soft and friable, as if it had undergone fatty degeneration—gave way along the middle line from the puncture (which was near the fundus) for an extent of from 3 to 4 inches down the body towards the neck. With very slight pressure a quantity of liquor amnii and a fœtus of about 5 months escaped. I then easily peeled off the placenta from the inner surface of the uterus. The organ did not contract, and there was free bleeding from three vessels close beneath the peritoneum at the lower angle of the rupture in the uterus. These vessels were secured by three silk ligatures. Oozing still going on from the surface where the placenta had been attached, I made a free opening into the vagina by passing my finger from above through the cervix and os, and then put a piece of ice into the uterus, and held it within by firmly grasping the organ, which then contracted. I then brought the peritoneal edges of the tear in the uterus together by an uninterrupted suture of fine silk, one long end of which I had previously passed into the uterine cavity, and out through the os into the vagina. By 7 or 8 points the edges were brought accurately together, and the other end of the silk was brought out through the opening in the abdominal wall, with the ends of the 3 ligatures on the vessels in the uterine wall, close to the pedicle, and all were tied to the clamp.'

Any one interested in the progress of the patient after this complicated operation may find a very full report in the journal to which I have referred. All I need say now is that she completely recovered. I have seen her several times since in excellent health, the last time in 1880. She reported herself well in 1881.

The interest of this case in relation to the subject under notice is in its bearing on the question, 'What should be done when a pregnant uterus is discovered during some stage of ovariotomy?' My answer would be, 'Let it alone.' But in a case of Dr. Atlee's in 1850, ovariotomy performed in the 2nd month of pregnancy was 'followed by such great irritability of stomach, in consequence of the state of pregnancy, that she could not be nourished, and she died, 30 days after, of starvation.' And in a case by Mr. Burd, of Shrewsbury, in 1847, of ovariotomy performed between the 3rd and 4th months of pregnancy, abortion took place 2 days after operation, and was followed by alarming symptoms, lasting several days. Still the patient recovered. Marion Sims also performed ovariotomy in the 3rd month of pregnancy, and did not detect pregnancy until the ovarian tumour had been removed. The patient recovered well, went the full term, and was safely delivered.

Supposing the operator has penetrated the uterus, if any conclusion can be drawn from the case in which I made this mistake and emptied the uterus, and from two other cases in which the same mistake was made by other surgeons who did not empty the uterus, but closed the puncture in its wall by wire sutures, both patients having died after aborting while mine recovered, it would appear to be the safer practice to empty the uterus, and either to close the opening in the

uterine wall by suture, or to perform supra-vaginal amputation of the uterus as advised and practised by Porro, afterwards by other Continental surgeons, and more recently here by Dr. Godson, as will be seen by referring to a subsequent chapter.

I now proceed to relate 4 other cases occurring in my first series of 500, in one of which ovariotomy was performed at the 4th month of pregnancy, after rupture of the cyst and peritonitis; in the 2nd, 3rd, and 4th the operation was a matter of election to avoid other dangers. The result was successful in all of them, the mothers being saved, 3 of them giving birth to living children after natural labours at the full period of pregnancy, and the 4th having recovered well after a rapid labour 11 weeks after ovariotomy.

Case 330.—The mother of 8 children, 36 years of age, was first seen on August 13, 1869. About a month before this an abdominal tumour, which had been slowly increasing after the birth of twins 16 years before, and had not prevented the birth of 6 other children, had suddenly and rapidly increased in size after an attack of severe abdominal pain and tenderness with sickness and fever. I ascertained the presence of an ovarian tumour with free fluid surrounding it in the peritoneal cavity, and depressing the recto-vaginal pouch, and the existence of pregnancy about the commencement of the 4th month. The fluid in the peritoneal cavity was from the rupture of the wall of a multilocular cyst, and the escape of the contents of a large cyst. On the following day I performed ovariotomy. The tumour, with its contents and the fluid surrounding it, weighed altogether 37 pounds.

This patient was delivered of a living child on February 18, 1870, after a natural labour, and went on well afterwards. But she died in 1871, of malignant disease of the uterus.

Case 399.—In this case a single cyst was removed at about the 3rd month of a 3rd pregnancy. A healthy child was born at the full time, and 3 other pregnancies have followed.

Case 419.—A married lady, 38 years of age, mother of 5 children. Her own mother had died of dropsy and abdominal tumour. A dermoid cyst, without pedicle, but with intestinal and omental adhesions, and of 18 years' growth, was taken away about the 2nd month of the 6th pregnancy. Recovery complete, and child born at full time. Died 10 years afterwards of pulmonary disease, but had also another abdominal tumour of doubtful nature.

Case 476.—On March 13, 1872, I operated on a married woman 29 years of age in the 4th month of pregnancy. To the right and above the uterus was a hard tumour, held up by omentum, which adhered to it, and having the right Fallopian tube only separated from it by the broad ligament. I cut away the tumour, leaving the Fallopian tube untouched. I did not feel either ovary, the uterus being so large and tense. The patient recovered, was delivered of a child at the 6th month of pregnancy, and did well. She has since given birth to a girl at the full time (1873), who is still living. The mother reported herself well in 1881.

The tumour was a nearly solid mass of white fibrous tissue, infiltrated in places with a thick transparent fluid, which had here and there collected in the distended areolæ. But towards the upper part there was a large irregular cavity divided by imperfect septa, lined with smooth membrane, and nearly filled with blood clot, partially organised. The pedicle was a small double layer of peritoneum, about $1\frac{1}{2}$ inch long and $\frac{1}{4}$ inch wide, enclosing a few vessels and some areolar tissue. The tumour measured in its long diameter $6\frac{1}{2}$ inches and in its short diameter $3\frac{1}{2}$ inches. It was the first fibrous tumour of the ovary that I had seen.

In the second series of 500 cases of ovariotomy, I performed the operation during pregnancy 5 times—making 10 cases in the 1,000. The following are brief notices of the 5 cases which occurred in the second 500.

Case 507.—Was a married woman, 32 years of age, and mother of 7 children. Pregnancy was not suspected, but the incision disclosed a large uterus below and to the left side. With it on the right side was a multilocular cyst, weighing 26 pounds. The left ovary was found applied to the side of the uterus, which was as large as at the 6th month of pregnancy. The clamp caused too much dragging, and was replaced by ligature. Labour pains came on the next morning,

the membranes were punctured, and in about 10 minutes a living child was expelled. The patient recovered rapidly, and afterwards presented herself at the hospital with another healthy child. This has since been followed by another birth and a 3rd pregnancy.

Case 752.—The lady was 37 years of age, at the 5th month of pregnancy, suffering from peritonitis and obstructed intestines, and almost moribund. Some relief was obtained by tapping and the removal of 9 pints of ovarian fluid from the peritoneal cavity. The next morning I took away a burst ovarian cyst. The child was born 9 hours after. The patient went on well for 2 days, but died on the 5th day after the operation. Considering that this is the only death after my 11 operations during pregnancy, and the desperate circumstances under which this one was undertaken, it will certainly appear that pregnancy does not add much to the danger of ovariotomy.

Case 798.—This lady was the wife of a medical man. She was 41 years of age and the mother of 6 children. I removed an ovarian tumour weighing 7 pounds. The uterus then extended upwards about half way between the pubes and umbilicus. The pedicle on the right side was secured by a clamp. She recovered perfectly, was delivered after an easy labour on April 23, 1877, and in 1884 was quite well.

Case 817.—The wife of a soldier admitted into the Samaritan Hospital, 1876, was 27 years of age, and had 1 child 2 years old. She was in the 3rd or 4th month of pregnancy. Two months later the fœtal heart sounds were very distinct in the right iliac region. The fundus uteri was 7 inches above the symphysis pubis, and above it was a large ovarian cyst. Ovariotomy was performed. The tumour weighed $11\frac{1}{2}$ pounds—9 pints of fluid, $2\frac{1}{2}$ pounds solid. When she was convalescent, uterine pains came on and a child was born alive. She has had 2 boys since, 1 born in 1878, the other in 1880, and in 1881 was quite well.

Case 879.—The wife of a surgeon consulted me in October 1877, 4 months after her marriage. She was 28 years of age, and although unsuspected at the time of marriage, there can be very little doubt that ovarian disease had begun a year or two before. She was married on June 27, 1877, and pregnancy may be dated from the 1st week in August. I operated on her on November 9, 1877. An ovarian tumour weighing 10 pounds was removed, a short pedicle on the left side being secured in a clamp. Recovery was uninterrupted, and a child was born on April 15, 1878. She was quite well in Australia in December 1881, having had four healthy children since the ovariotomy.

I have only once operated during pregnancy since completing 1,000 cases of ovariotomy.

Case 1138.—I performed ovariotomy on January 22, 1885, on a married lady 28 years of age. She was married in 1881, had a miscarriage in July 1882, and until I first saw her with Dr. Priestley, in December 1884, suffering from an ovarian cyst which was increasing rather rapidly, there had been no suspicion of a subsequent pregnancy. After removing a large multilocular cyst of the left ovary, the uterus was seen to be about the size expected. A fœtus of the 3rd month came away without pain or difficulty 6 days afterwards. The wound was quite healed and the stitches removed on the 7th day, and recovery went on quite as well as in patients not pregnant.

Careful consideration of the cases just related will lead, I think, to the following conclusions:

1. Pregnancy and ovarian disease may go on together. The birth of a living child and the safety of the mother have been observed under this complication.

2. But in a large proportion of cases—probably in nearly all where an ovarian tumour is large—there is danger of abortion; or, if the pregnancy proceed to the full term, of lingering labour and a still-born child; and throughout the latter months of pregnancy there is danger of sudden death to the mother from rupture of the cyst or rotation of its pedicle.

3. Spontaneous premature labour may not save the mother from these perils, and the induction of premature labour artificially almost implies sacrifice of the child with considerable risk to the mother.

4. There is no proof that tapping an ovarian cyst is more dangerous during pregnancy than at any other time; and if there be a large single cyst, tapping will afford immediate relief to distension at a

very slight risk to the mother, and lead to the natural termination of pregnancy in the birth of a living child, if proper precautions be taken to prevent the escape of ovarian fluid into the peritoneal cavity, and the entrance of air carrying germs into this cavity, or into the cavity of the cyst. In cases of multilocular cyst, tapping can be of very little use.

5. In cases of multilocular cyst, or solid tumour, the rule should be to remove the tumour in an early period of pregnancy: and if an ovarian cyst should burst during pregnancy at any period, removal of the cyst and complete cleansing of the peritoneal cavity may save the life of the mother, and pregnancy may go on to the full term.

6. Of 3 cases on record where a pregnant uterus has been punctured during ovariotomy, the only recovery was in the one case where the uterus was emptied before the completion of the operation, and the opening in its wall closed by suture.

CASES OF OVARIOTOMY DURING PREGNANCY

No.	Medical Attendant	Age of Patient	Period of Pregnancy	Date of Ovariotomy	Weight of Tumour	Result to Mother	Result to Child	Subsequent History
1	Mr. Cook, Clovelly	24	4th to 5th month	Aug. 1865	28 lbs.	Recovery	Fœtus removed at same time	Well in 1881
2	Mr. Bateman, Islington	36	3rd month	Aug. 1869	57 lbs.	Recovery	Alive; Natural labour Feb. 1870	Died of Cancer of Uterus, March 1871
3	Dr. Goddard, Highbury	28	3rd month	Dec. 1870	15 lbs.	Recovery	Alive; Natural labour July 1871	Children born, 1873, 1876, 1878. Well in 1884
4	Dr. Ross, Bloomsbury	38	3rd month	May 1871	34 lbs.	Recovery	Alive; Natural labour Dec. 1871	Child born, Jan. 7, 1877. Pulmonary disease and abdominal tumour of doubtful nature in 1881
5	Dr. Moore, Ipswich	29	4th month	March 1872	10 lbs.	Recovery	Alive; Natural labour May 1872	Child born, May 1873. Well in 1881
6	Mr. Coleman, Woolwich	32	7th month	Aug. 1872	26 lbs.	Recovery	Seven months' child, born day after operation	Five children since — viz. 1873–75–76–78 and 79. Died soon after last birth
7	Dr. Kidd, Dublin	38	6th month	March 1876	40 lbs.	Died five days after	Fœtus expelled 9 hours after operation	
8	Dr. Roberts, Cheshunt	41	4th month	Oct. 1876	7 lbs.	Recovery	Child born April 1877; Labour natural	Well 1884. No more children
9	Surgeon-Major Perry	27	7th month	Dec. 1876	12 lbs.	Recovery	Child born 25 days after	Boys born, 1878 & 1880. Well in 1881
10	Mr. Stirling	28	4th month	Nov. 1877	10 lbs.	Recovery	Child born 6 months after	Four children since. Well in Dec. 1884
11	Dr. Priestley	28	3rd month	Jan. 1885	15 lbs.	Recovery	Abortion 6 days after	Well March 1885

CHAPTER XIII

ON INCOMPLETE OVARIOTOMY AND EXPLORATORY INCISIONS

WHEN I began to publish every case where I had completed the operation of ovariotomy, and published, in separate series, cases where the operation was commenced but not completed, and cases where an exploratory incision only was made, I

had to reply to objections advanced by critics who considered that the fatal cases of exploratory and incomplete operations ought to be counted among the unsuccessful cases of ovariotomy. If I asked whether the cases which recovered from the operation when only part of the cyst had been removed, or when a cyst had been simply emptied, should be counted among the successful cases, the answer was, 'Certainly not, because ovariotomy had been only attempted, and the attempt had failed.' One great reason why ovariotomy was so long before it was received at all cordially by the profession was, that incomplete cases, or cases of simple incision, had been classed among cases of ovariotomy, while unsuccessful cases were left unpublished. In the so-called statistical tables, cases of complete and incomplete ovariotomy and of exploratory incisions were so grouped together that it was impossible to ascertain, without a good deal of inquiry, what where the real results of even the published cases; and in more than one of the most recent tables this confusion is still more deplorable. Cases of abdominal section are confounded together, without any separation of cases of ovariotomy from others of very different character, thus grouping together sections made with widely diverse objects, and involving risks, in some very great, in others very slight. The best way of avoiding this error seems to be to give a truthful and exact account of every case of ovariotomy, or of myomotomy, nephrectomy, or of obstructed intestine, or any other condition which leads to the section in the order of its occurrence. When considering ovariotomy, it should be shown how frequently the attempt to remove an ovarian tumour had been made, how often it had succeeded, what were the results of completed operations, how often the attempt had been only partially successful or had failed, what were the results of incomplete operations, how often diagnosis had been so doubtful that an exploratory incision was necessary before the doubt could be solved, and what risk the patient incurred by submitting to an exploratory incision. This plan appeared, and still appears to be, better calculated than any other to present a true picture of the occurrences of actual daily practice; and, I think, the tables which I published in 1872, including every case where I completed ovariotomy, and every case where I had not completely succeeded, or had made an exploratory incision either to satisfy my own doubts or those of others, or in compliance with the earnest solicitation of a patient, gave far better means of forming a correct estimate of the real results of ovariotomy than if the 52 cases which the supplementary tables contained had been included among the completed cases of ovariotomy. The proportionate mortality would have been slightly increased. Instead of 500 cases, with 127 deaths, and a mortality of 25·4 per cent., we should have had 552 cases, with 146 deaths, and a mortality of 26·44 per cent. —a difference of not much more than 1 per cent.—while discredit would have been thrown upon the whole series of cases by the manifest fallacy that cases were enumerated as ovariotomy where the operation had only been begun and could not be finished, and that the patients who recovered from the operation were not cured of the disease even if they gained some temporary benefit. By correctly classifying all the cases, as I did in three series, all possible objection was removed. The tables show that while in some 14 years the operation of ovariotomy had been completed by me 500 times, it had during the same period been found impossible to complete it in 28 cases, and that in 24 other cases exploratory incisions were necessary to perfect diagnosis.

On looking over in 1881 the tables published in 1872, and in adding cases of exploratory and incomplete operations between these years, 33 in number, making 85, to the 1,000 completed ovariotomy cases, I found that in almost every case doubts or suspicions entertained before the incision was made were confirmed, and I scarcely recollect a case where an exploratory incision was thought to be necessary which proved to be an ordinary case of ovarian disease. My experience since 1881 confirms my former statement, that occasionally, after commencing by an exploratory incision, I have found it possible to remove an ovarian tumour, but there has always been some peculiarity in the case which led to this unusually cautious mode of procedure. Anyone who will carefully study the chapter on diagnosis, in the earlier part of this volume, will find good reason for believing that the diagnosis of ovarian tumours, and of the

conditions favourable or otherwise for operation, is already as well established as that of any other form of disease requiring surgical operation. No surgeon about to attempt to relieve a strangulated hernia can foresee exactly the conditions he may meet with. The lithotomist may find a larger or smaller stone than he expects; aneurism is not always cured by the ligature of the artery supposed to be involved; and mammary tumours supposed to be malignant are found not to be so in some cases after removal, or those supposed to be innocent prove to be malignant. Indeed, throughout all surgery we share with physicians the difficulty of practising an *ars conjecturalis*, and it is no reproach to a surgeon, if, acknowledging doubt, he endeavours to clear up that doubt by commencing his operation with an exploratory incision. With our present knowledge it is almost incomprehensible that Frederick Bird should have been compelled by Cæsar Hawkins to acknowledge that, in addition to the few cases of ovariotomy which he had completed and published, he had also made exploratory incisions, or had commenced the operation and had failed to complete it, in about 40 other cases. And there can be no doubt that if a surgeon for every case of completed ovariotomy must necessarily encounter such difficulties that he would be compelled to leave several cases incomplete, or repeatedly meet with such insuperable difficulties in diagnosis that he could only satisfactorily clear them up by an incision, it would be a very grave objection to the principle of the operation. Happily, with advancing knowledge doubts are being cleared up and difficulties lessened, exploratory incisions are becoming less frequently necessary, and incomplete are bearing a diminishing proportion to complete operations.

Of late years simple exploratory incisions, made under due precautions against septicæmia, have been almost free from risk. If a cyst be simply tapped, the risk is hardly, if at all, greater than that of an ordinary tapping, and the patient is neither more nor less relieved. Where adhesions are separated and portions of a cyst or tumour are removed, the danger is considerably increased. When a permanent opening of the cyst by incision, and union of cyst wall to abdominal wall by suture is accomplished, even with a drainage-tube and antiseptic injections, the risk of pyæmic fever or septicæmia must be encountered; but in several cases a cure has been obtained. In one case which I operated on in 1865 in the Samaritan Hospital, where an ovarian cyst depressed the anterior wall of the vagina and extended 4 or 5 inches above the umbilicus, I made an incision from 1 inch below the umbilicus downwards for 5 inches. There were no adhesions anteriorly, but after tapping the principal cyst, and emptying it of several pints of fluid containing much blood, its attachments to the brim of the pelvis and to the right side of the uterus were found to be so close that I resolved not to attempt their separation, but to replace the empty cyst. There was, however, such free hæmorrhage from the opening into the cyst made by the trocar, and even from the little punctures made by the hooks which seized the cyst wall, that it was obviously unsafe to return it; and I transfixed the edges of the external parietal wound, and of the cyst wound, with a hare-lip pin, and secured them together with a twisted suture. The rest of the abdominal wound was closed with 4 deep silk sutures above the pin, and 1 below it. The patient rallied well, but for a few days had feverish symptoms. The stitches were removed in due time, and a very free discharge of serum gradually set up, just at the point where the cyst had been pinned to the abdominal wall. Convalescence progressed. There was but a very little discharge from the bottom of the cicatrix, and a slight hardness and elastic swelling felt per vaginam. The abdominal tumour disappeared, and I saw her in 1872 in excellent health, without any trace of her tumour.

In another case the patient was in good health for nearly 3 years after the operation, and then died almost immediately after a subcutaneous injection of morphia, in Germany.

In May 1877, I attempted to remove an ovarian cyst from a girl, 17 years of age, in the Samaritan Hospital. I found such inseparable attachments that I contented myself with clearing the cyst cavity of 6 pints of purulent fluid and flakes of lymph, closing the cyst and abdominal wall round a glass tube, and covering the end of the tube with a carbolised sponge. The patient remained in the hospital till August 16, suffering from a good deal of

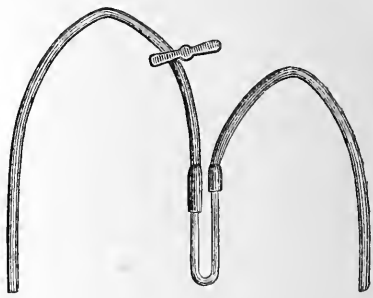
fever, treated by the ice-cap and quinine, while the cyst was washed out with carbolised solutions. After she left the hospital sulphurous acid was substituted for the carbolic with an immediate change for the better. A continuous stream of the diluted solution was kept running through the cyst by a siphon arrangement, and at the same time she was vigorously nourished. She recovered sufficiently well to become a nurse, although there was at times some discharge from the sinus in the abdominal wall which never entirely closed. She was nursing in the Samaritan Hospital in the early part of 1881, but died towards the end of the year, or the beginning of 1882.

In 1880, and in 1881, I twice laid open adherent cysts, but did not attempt to remove them, trusting to the free escape of their fluid contents into the peritoneal cavity and absorption. In neither case, so far, has there been any sign of reformation of fluid.

The painful position of a surgeon who has laid bare an ovarian tumour, has partly emptied it, has separated some adhesions, and then begins to fear that he cannot completely remove the tumour, can only be estimated by those who have unexpectedly found themselves in similar difficulties. If the difficulty is recognised early, and the cyst only exposed and emptied, the patient is scarcely in a worse condition than after tapping. Indeed, the incision leads to the avoidance of some of the dangers of tapping ; the surgeon can see what vessels he wounds, and he can close the opening in the cyst if he please, while a short incision in the abdominal wall can by itself add little to the risk to the patient. But if extensive adhesions have been separated, the surgeon is tempted at any risk to complete the operation by the feeling that he can hardly leave his patient in a worse state, and that her only hope is in his boldly following out his intentions. In the very first case I ever operated on, the patient recovered from the incision, died 4 months afterwards from spontaneous rupture of the cyst into the peritoneal cavity, when it was found that there would have been no insuperable difficulty if the operation had been proceeded with. On the other hand, post-mortem examination has shown that some of the tumours could not have been removed during the life of the patient, as they could only be separated after death by careful dissection.

In any case where difficulty threatens to be insuperable, rather than persevere at any risk, the surgeon acts more prudently if he trusts to antiseptic drainage after one or other of the methods just described.

A simple mode of drainage is described by Dr. Robertson in the first number of the 'Medical Chronicle,' published at Manchester, October 1884. The object in this plan of draining is the absolute exclusion of air both from the cavity containing the fluid and from the draining apparatus. Its peculiarity consists in the fixing of an air-trap to the free end of the rubber draining-tube. This trap is merely a V-shaped piece of glass tubing, each arm measuring from 2 to 3 inches. The discharge is conveyed from the trap into any convenient receptacle by a second piece of tubing.



When this apparatus, filled with an antiseptic solution of corrosive sublimate, 1-1000, is properly fixed in a cyst or abscess, the contents flow in obedience to the laws that regulate the movements of fluids. Proper precautions are taken in the introduction of the tube into the wound or cavity to prevent the access of air by the opening. To secure its action the trap is fixed below the level of the abscess or cyst, and the draining force is measured by the perpendicular distance between the fluid level of the cavity and the fluid level of the trap. The longer the distance the greater the force. In draining for an amputation, a fall of 1 inch serves the purpose. In cysts or abscesses, 2 or 3 inches to a foot may be employed so long as the discharge is free. Excess of force is indicated by obstruction of the tube, due to the tissues being sucked

into it, or by the recurrence of pus after the discharge has become serous. If used in a case of incompleted ovariotomy, the opening in the abdominal wall and the cyst cavity would of course be accurately closed around the tube. If used as a supplement to tapping, it would be necessary to use the trocar and elastic canula, afterwards fitting the tube over the end of the canula.

CHAPTER XIV

OÖPHORECTOMY—OR BATTEY'S OPERATION

THERE are no means of judging what would be the risk of simple castration in healthy adult women. But from what we know of it as practised on the lower animals, the risk would probably be trifling.

Modern surgery has shown what can be accomplished in extirpating ovarian cysts, and with what small danger. Without this demonstration no one would have thought of treating functional diseases of the ovaries by the same surgical operation. Battey did this when he castrated a young woman in 1872, acting, as there is reason to believe, independently of any acquaintance with the suggestion made by Blundell in 1823, that 'extirpation of the ovaries would probably be found an effectual remedy in the worst cases of dysmenorrhœa and in bleeding from monthly determination in the inverted womb where the extirpation of that organ was rejected.' Though the procedure had about it an air of plausibility, it was a piece of surgery about on a par with amputating for an aneurism. Battey had to deal with organs supposed to be at fault, and to prevent the mischief they were causing, all other treatment having failed. Two alternatives were at his choice; he could either cut out the ovaries, or he could try to bring about their atrophy. He took the first, and nothing in what he has said or written shows that he ever thought the second possible.

When Bell snipped out part of a nerve, or when the surgeons of to-day have stretched a nerve to stop a neuralgic pain, a well-known principle guided them. So it was with Hunter, when he tied the femoral artery to cure aneurism of the popliteal. And Nature herself has recourse to the same device in twisting the pedicle of an ovarian tumour. But it is not always so easy as it might seem to carry out scientific principles in surgical practice. No one had tied the spermatic artery, and no one had cut or stretched the spermatic nerve, and Battey cautiously withheld his hand from such experimental practice. Ovariotomists had shown him what was within his power, and he elected to try that which was possible and easy. So the science of the 19th century has had for a time to give place to the rude chirurgical art of the 17th. Other surgeons have accepted this position, and have repeatedly extirpated the normal ovaries of women.

Battey's object was to bring about premature cessation of menstruation in women who suffer from the malperformance of their monthly functions; but others, as Hegar, have given a wider range to the idea of suspending the functions and influence of the ovaries. They remove them to stop the growth of uterine fibroma or myoma, thereby lessen their hæmorrhagic tendencies, and lead to atrophy of the growths. And the amount of success which I and others have obtained in cases of bleeding uterine myoma by removing the ovaries, is quite sufficient to justify the proceeding in cases where the removal of the uterine tumour would be very difficult or dangerous. But the extension of this practice, or the carrying out of Battey's proposal far further than he ever advocated or intended, is so open to abuse, that in mental and neurotic cases it is only to be thought of after long trials of other tentative measures and the deliberate sanction of experienced practitioners.

In the case of fibroid growths with much bleeding, the position is not the same. There life is threatened, the danger constantly increasing, and the last resource the very serious operation of amputation of the tumour or of the uterus. If it can

be proved that the annulment of ovarian function, even at the cost of the organs, arrests the development of the uterine growth, or checks bleeding, then the surgeon may rightfully remove the ovaries. But that the neurotic or mental conditions justifying such an operation are exceedingly rare is evident from the fact that, since 1878, I have only met with 8 patients to whom I could recommend the operation. One of these refused to the last the chance of relief from surgery, although it was urged upon her both by Battey, Marion Sims, and by me. Four operations were purely Battey's. The first of these was reported in the Transactions of the American Gynæcological Society for 1880. The patient was in her 50th year and had never been pregnant. Her history was that of 14 years' suffering, with every kind of experimental treatment. There was association of severe suffering with pre-menstrual congestion, justifying the belief that ovariotomy, performed with the view of anticipating the climacteric, would be a legitimate proceeding. We had deferred the operation in the hope that at the age of 49 the catamenia would cease. But a sister, aged 54, was still menstruating regularly; and the patient felt that it would be impossible for her to go through 4 or 5 years more of such repeated suffering. After full consideration, both ovaries were removed. The patient was very grateful for the relief afforded her. I saw her in 1884 quite well, there having been no return of catamenia since April 1880. The recurrence a few times after the operation is explained by the difficulty I had in removing every fragment of the left ovary. I may quote here the conclusions which I drew from a consideration of this case: 'If I meet with what I believe to be a suitable case, and a willing patient, I shall certainly do this operation again; removing both ovaries, and being especially careful that every fragment of both ovaries is removed. I should operate rather through the abdominal wall than by the vagina; and be prepared for the probability of intestines being wounded when dividing the peritoneum. In uniting the edges of the wound, I should place the sutures nearer to each other than is usual in ordinary ovariotomy, in order to guard against the occurrence of a ventral hernia.' I still adhere to these conclusions. I think it would be only in an exceptional case, where an ovary could be felt low down between the vagina and the rectum, that a surgeon would now do oöphorectomy through the vagina. In almost all cases the abdominal operation would be preferred, and a word of caution is necessary to anyone about to perform it under the impression that it is very facile in execution; for it is more difficult than ordinary ovariotomy. It is not as easy to divide the peritoneum without injury to the intestines. They have a greater tendency to protrusion, and cannot be replaced readily after they have protruded. The opening into the abdomen should be made large enough to admit two fingers. With these the uterus is to be felt; one finger being in front of the fundus and one behind it. Then, by carrying them outwards, first on one side and then on the other, an ovary is felt and may be brought up outside the abdominal wall. Its connections with the uterus are transfixed and tied in two parts with a silk ligature; a third ligature being placed behind the other two. The ends of all must be snipped off close to the knots, and the ovary cut away not too near the ligatures, which are then allowed to slip down into the pelvis. It is not yet decided if the fimbriæ and part of the Fallopian tube had better be removed with the ovary. If not quite healthy, they should certainly be removed. After the second ovary has been removed, the wound must be closed as usual after ovariotomy, but with the sutures nearer to each other, to obviate the greater tendency of omentum or intestines to separate the lips of the incision. The tension is always greater in these cases than after removing large ovarian tumours, where the integuments have been a long time on the stretch. The dressing and after treatment should be precisely the same as for a case of ovariotomy.

Between January 1878, the date of this first case, and November 1881, or nearly 4 years, I did not repeat this operation, and I had only advised it in one other case, that lady not being willing to submit to it. The lady on whom I operated in November 1881 was a widow, 37 years of age. She had suffered excessively for about 18 months from the pressure of a hard pelvic tumour, which obstructed the rectum and caused great agony and danger at each catamenial period. At the operation the tumour was found to consist

partly of the right ovary, not much enlarged, and partly of the thickened and retroflexed fundus uteri, which I was able, but with great difficulty, to draw up above the brim of the pelvis. I removed the right ovary; the left was atrophied, and so closely applied to the side of the uterus that I could not distinguish its outlines, and did not disturb it. The patient made a recovery without any fever, and in the summer of 1884 was quite well, having menstruated regularly since the operation, at 3 weeks' interval, without any inconvenience. Here, of course, it is doubtful how far the relief is due to removal of one ovary, or to the reposition of the displaced uterus. Neither in my own operative practice, nor in consultation with others, have I seen more than 4 patients since November 1881, to whom I have advised oöphorectomy, or the removal of ovaries not distinctly enlarged, on account of neurotic or neurasthenic symptoms, or of dysmenorrhœal suffering. In one of these cases the operation was performed by a provincial surgeon. Another patient is a ward in Chancery, and legal obstacles have led to postponement. I performed the operation on the third patient in October 1882, removing the right ovary and the Fallopian tube. The left ovary had been removed in March of the same year in Paris by Péan, who wrote to me that he found it in a condition which he described as '*Kystique, hypertrophique et cicatriciel très prononcé.*' The right ovary was, he said, '*à peu-près normal*,' and was therefore not removed. The history of the case before Péan's operation is that of an extremely sensitive, excitable, clever woman, unmarried, who, between her 20th and 30th year, was occasionally treated by Dr. Oldham for irregular menstruation, but did not suffer much pain at her periods until her 30th year. Then followed 10 years of invalid life, with great pain at her periods. An operation in 1879, when her age was 37, was done by Mr. Heath for internal piles. In 1880, Dr. Meadows and Dr. Graily Hewitt treated her for enlargement of the left ovary. This was followed by enfeebled general health and increase of pain, with failing nerve power. In 1881, 3 months' trial of electric current and German baths gave no relief; until physical and mental prostration, with recurring ideas of suicide, led Dr. Pratt, of Paris, to recommend the operation, which was performed by Péan, as I have just said, in March 1882. The patient rapidly recovered from the operation. The wound healed by first intention. She walked on the 18th day, but on the 23rd day menstruation returned with excessive suffering and high fever, and she was considered in great danger for more than 8 days. She returned to England in May, 9 weeks after the operation, and consulted Dr. Oldham and Dr. Herman Weber. As her distressing symptoms increased to an alarming extent, her menstrual periods being regular, with the pain and the mental depression invariably aggravated at the periods, she consulted Dr. Playfair, who sent her to me. I operated on October 10, 1882. Mr. Meredith assisted me. Dr. Allan, of Cleveland, U. S., and Dr. Fontana, of Zurich, were present. I made an incision $\frac{1}{2}$ an inch to the right of the cicatrix left by Péan's operation. After separating omentum, which adhered along the whole line of union, I drew up the right ovary, transfixed the broad ligament with a double ligature, and after tying the ligament in two parts, cut away the ovary. As the Fallopian tube was very red, tortuous, and irregularly though slightly dilated, I put another ligature round the tube, about 2 inches from the fimbriæ, and cut away all beyond the ligature. I then separated all the omentum which adhered on either side of the united incision of Péan's operation, putting 2 ligatures upon omental vessels. The wound in the abdominal wall was closed in the usual manner. The whole proceeding was completed in less than half an hour. The ovary removed was about 3 times the normal size, and contained cystlike cavities, one as large as a chestnut. The patient recovered without trouble of any kind, went to Brighton 3 weeks after the operation, and I have received most grateful letters from her since. She called on me in December 1884, saying that there had never been any return of menstruation since the operation, and that in spite of unfavourable surroundings and family trouble, she was perfectly well. She mentioned a curious fact, which other patients who have recovered after ovariotomy have also observed—that her hair, which she had almost entirely lost during her illness, had grown luxuriantly since the operation; and I noticed that it was fine, abundant, and without a tinge of grey.

I operated on the 4th patient August 26, 1884, at Amsterdam. She was

unmarried, 25 years old, and since her 17th year had suffered excessively from pain in the right side of the abdomen. After a great variety of medical treatment, Professor Simon Thomas, of Leyden, at the suggestion of her usual medical attendant, Dr. Van Geuns, took away the right ovary in September 1878. The pains on the right side disappeared, but recurred so severely on the left side, that in September 1879, Professor Simon Thomas removed the left ovary, but without good result. He did not remove either Fallopian tube. Menstruation recurred, and the pains became worse. In September 1880, Dr. Berns opened the abdomen for the third time, hoping that it might be possible to remove a tumour which it was thought could be felt on the left side of the uterus. There were, however, so many adhesions that he desisted, and closed the wound. During all these years the patient was always in bed, every movement causing a great increase of pain. In 1883 Marion Sims went to Amsterdam to see her. He thought the tumour on the left side of the uterus was the cause of the suffering. Being obliged to go to America, he would not operate then, but promised to do so on his return to Europe. His death greatly distressed the patient, and led to my being consulted. She and her family, as well as Dr. Van Geuns, were so anxious that some attempt to relieve her continual sufferings should be made, and the habit of daily repeated subcutaneous injections of morphia should be broken, that, although I was unable to feel any tumour on either side of the uterus, I consented to open the abdomen for the fourth time, and did so to the left of the central cicatrix. The cicatrix of the second operation was still nearer to the left ilium. I only divided the peritoneum far enough to admit two fingers. This enabled me to feel that the uterus was of normal size, movable, with no tumour on either side of it, but that a piece of omentum adhered both to the fundus uteri and the cicatrix to the extreme left, and that a coil of small intestine also adhered both to the uterus and the omentum. These I separated, but did nothing more, and closed the wound. I could not find any trace of either ovary. The wound healed by first intention, and recovery took place without any fever. There have been three menstrual periods since the operation, with diminishing pain. Very much smaller quantities of morphia have been injected, and Dr. Van Geuns sends a very hopeful report of continued improvement.

Since the printing of this edition was begun I have removed both ovaries from a married lady, a patient of Dr. Lendon of Notting Hill, under very peculiar circumstances. She has 2 living children; one, born alive, is now dead. After each confinement she suffered from puerperal mania; and once the consequences were tragically distressing. Dysmenorrhœal suffering was also very great. Partly to prevent this, and partly to avert another pregnancy, after some hesitation and careful consultation, I removed both ovaries on January 27, 1885. There was no difficulty in the operation, and recovery followed without pain or fever. It is, of course, too soon to say more as to the ultimate result.

The removal of the ovaries with the hope of influencing uterine growths will be further considered in the chapter on these tumours. But I cannot conclude this chapter without a word of caution against the extreme frequency with which the operation has been resorted to in this country, and at which Dr. Battey publicly expressed his astonishment, at the meeting of the Medical Congress in London. Many cases where the symptoms have been described as sleeplessness, hysteria, nerve prostration, dysmenorrhœa or 'neurasthenic disorder,' have led to Battey's operation, and in the majority of such cases healthy ovaries have been removed. These are just the cases in which Dr. Weir Mitchell's systematic treatment, so successfully followed in this country by Dr. Playfair, should surely have been tried. Dr. Playfair says, 'If a case is purely neurasthenic it cannot under any conditions, I apprehend, be one even for the consideration of oöphorectomy. If, on the other hand, there exist those chronic organic changes in the ovaries which afford the most justifiable ground for this operation, any attempt at their cure by this treatment will inevitably fail.' Except in cases where bleeding fibroids may call for the removal of the healthy ovaries, or where some such reason arises for preventing future pregnancy as that in the case just related, we ought at least to require some evidence of the ovaries being diseased before consenting to their extirpation in the hope of curing any of those vague nervous disorders to which women are so subject, which are

often dispelled by moral treatment or social changes, are often benefited by measures that can have but little effect except on the imagination, often return after apparent cure in any way, and leave the hapless beings the prey of unscrupulous or illogically enthusiastic experimenters.

In a paper read at the Medical and Chirurgical Society in 1882, on hernia of the ovary, Dr. Barnes contended that this condition furnishes a legitimate motive for Battey's operation. He related a case in which an ovary, accompanying a hernia in the left groin, had been removed from one of his patients in St. George's Hospital. In the discussion which followed Mr. Hulke alluded to the comparative frequency of this form of hernia, and cited a case, under the care of Mr. Lawson some years ago, in which the suffering was so great that at the wish of the patient the organ was extirpated. Mr. Langton also showed, from his own experience of 20 years at the Truss Society, that out of 4,084 cases of inguinal hernia no less than 67 were instances of these displaced ovaries. Forty-two of the 67 were congenital and 25 acquired. Those which were congenital were generally double, most of them were irreducible, and the effects with regard to the menstrual periods varied very much. Dr. Barnes attributed the larger number being on the left side, to the greater length and laxity of the left round ligament, and the greater depth of Douglas's pouch on the left than on the right side; and said that in this way other pathological conditions more frequently observed on the left than on the right side, such as hæmatocele, might be accounted for. He was of opinion that where there was pain and distress it was better to remove the hernial ovary, which was liable to become inflamed and diseased, while trusses were apt to cause distress.

At the Meeting of the Medico-Chirurgical Society of Edinburgh, November 7, 1883, Dr. MacGillivray showed an ovary and a Fallopian tube which he had removed from an inguinal hernia in a girl about 20 years of age. And at the same Society Professor Chiene showed an ovary and part of a Fallopian tube which he took away from the inguinal region of a child only 3 months old.

It is somewhat curious that in all my practice I have never met with a case of hernia of the ovary.

The last reports which I have respecting Battey's operation are those to be found in Professor Agnew's 'Surgery,' published in Philadelphia. He mentions 107 cases, of which 88 were complete double operations. Sixty-seven recovered and 21 died, a mortality of 23·86 per cent. In all, he gives the figures of 171 cases; 144 by abdominal section, with a loss of 27, and 27 vaginal, of which 5 died.

In the 'Ingleby Lectures' for 1881, Dr. Savage, of Birmingham, said that, while Battey, from all the information he could obtain, found the mortality to be about 18 per cent., in his own (Dr. Savage's) practice he had 'had 40 complete cases, with a result that all have recovered from the operation, and I believe that nearly every one has been cured of the disorder for which the operation was undertaken' (p. 33). Writing again, December 5, 1884, he says, 'My figures are as follows up to this date:

Removal of the Uterine Appendages

For Myoma . . .	37	with 1 death	*from Tetanus*
„ Hydrosalpinx .	10	„ 1	„
„ Pyosalpinx . .	6	„ 1	„
„ Chronic Ovaritis, „ Dysmenorrhœa, and Neuralgic Symptoms, &c.	81	„ 3	„
Total . . .	134 cases with 6 deaths.		

Dr. Savage removes both ovary and Fallopian tube, but he appears to agree with me in the impression that ligature of the spermatic artery has more to do with the cessation of menstruation after operation than the removal of the tube itself.

Dr. Fehling, of Stuttgart, contributes to the 'Archiv. für Gynäkologie' (Band xxii. Heft 3) an interesting article on the 'Castration of Women.' He relates 10 cases, and then expresses opinions based upon these and upon other recorded cases. As to mortality, this will diminish. Hitherto it has been about 10 per cent., but he thinks with our present experience it is not likely in the future to exceed at most 5 per cent. Next as to the effect upon menstruation. In 4 cases out of 9 he found the menopause immediately follow. The same happened in 4 cases out of 10 published by Tauffer, and in 31 out of 41 recorded by Hegar. Irregular hæmorrhages for a time followed by complete cessation resulted in 3 of our author's 9, in 3 of

Tauffer's 10, in 8 of Hegar's 41. Hæmorrhage continued to recur for a long period (2 years or more) after operation in 2 of Fehling's cases, 3 of Tauffer's, and 1 of Hegar's. The results of other operators give similar figures. He then considers the effect in different classes of cases. In cases of uterine fibroids the results are excellent. In 5 out of 6 cases of his own in which spaying was performed for fibroids, the menopause followed. In 21 similar cases of Hegar's, 3 died. The menopause followed immediately in 11, gradually in 6; in only 1 did hæmorrhage persist. Fehling removed the ovaries for ovarian neuralgia in 1 case only; relief was slow but complete. In nervous and mental diseases he finds the results are not good; even when benefited for a time, symptoms return. Goodell's proposal, that all insane women ought to be spayed, Dr. Fehling rejects absolutely. He quotes Liebermeister to the effect that in hysteria, unaccompanied with local disease, castration ought not to be performed. He does not think it necessary, even if possible, to feel the ovaries before commencing the operation. He has not observed any loss of sexual feeling as a result of the operation.

The Samaritan Hospital register shows no oöphorectomies until December, 1880, from which date up till December, 1884—i.e. exactly four years—the number recorded reaches 20. Of these 15 were for fibro-myoma with menorrhagia, and 1 of them proved fatal. The remaining 5 were for dysmenorrhœa, and all recovered. Bantock operated 8 times, and Thornton 12. Two cases recorded by Meredith were not patients in the Samaritan, but in the New Hospital for Women in Marylebone Road.

CHAPTER XV

RESULTS OF OVARIOTOMY. SUBSEQUENT HISTORY OF PATIENTS WHO RECOVERED

The fact that of 1,139 who have had one or both ovaries removed by me, 891 have recovered from the operation, is alone sufficient to justify the principle of the operation, and to prove that the mortality—namely, 21·7 per cent. on the whole number, but which has fallen from 34 in the first 100 to 11 in the last—is smaller than that of many capital operations which are constantly performed without hesitation in suitable cases. And this mortality has of late become so small, death scarcely ever occurring except in cases known before operation to be unfavourable; while recovery is secured in almost every favourable case, that (excluding septicæmia) we may confidently calculate upon an average death-rate of not more than 3 or 4 per cent. And when we consider that a patient from whom one ovary has been removed can scarcely be said to be mutilated; as she is perfectly capable of fulfilling all the duties of a wife and mother, menstruating regularly, and bearing children of both sexes, without any unusual suffering either during pregnancy or labour; ovariotomy ought to be accepted as a more certain means of saving life from threatened death, restoring the sufferer to perfect health, and rendering her apt for all the requirements of daily life, with a smaller risk than almost any other serious surgical operation.

Fears have been expressed that when a patient recovered after ovariotomy she would in some way or other suffer in after life, that she would not menstruate regularly—that, if she married, she would not have children, or have children of only one sex—that she would become excessively fat, or lose her feminine appearance and her sexual instinct—or that her life might be shortened by some disease originating in the operation, or by the effects either upon some bodily organ or upon the mind. In order to ascertain how far any of these fears were well founded, or were exaggerated, or were purely imaginary and destitute of foundation, I asked every patient who recovered to write to me once every year, on the anniversary of the operation, giving me full information as to her state. Nearly all promised compliance, and a few have written several years in succession.

Many have written once or twice, some I have occasionally seen, but there were so many of whom I heard nothing that in May and June, 1872, and at the latter end of 1881, I sent a circular to every patient who had recovered after ovariotomy in my practice, or to the medical friend by whom she was sent to me, asking for information on the following points, and in this form:

Name of patient.
Date of operation.
Present state of health.
If married since—when?
Is husband still alive?
If any children—
  Date of births.
  Sex of children.
Anything unusual in—
  Pregnancy,
  Or labour.
If dead, cause and date of death.
Any other information connected with the operation or the patient which may seem important.

*Signature*_____

*Date*_____

From circulars returned to me, and from other sources, I am able to say that of the 1,000 women who submitted to ovariotomy by me between February 1858 and June 1880:

449 reported themselves well in 1881.
11 were well in 1880, and have not been heard of since.
86 were well in 1872 and have since made no report.
55 have reported themselves well within the last 10 years without answering my last letter in 1881.
50 have made no report of themselves since the operation:

651

Making 651 either alive or not known to be dead.
127 died after operation among the first 500.
105 died after operation among the second 500.
117 died since recovering from the operation.

1,000

Of the 117 deaths since recovery from operation:

29 died without cause assigned.
43 died of diseases of the brain, heart, or lungs, quite unconnected with the operation.
7 died of diseases of the abdominal or pelvic organs.
32 died of malignant disease of various parts.
6 died of return of the ovarian disease.

117

Of the 1,000 women operated on:

439 who were married at the time recovered from the operation.
70 of these have since given birth to 126 children.
36 have had one child (1 stillborn) =36
18 have had 2 children (one twins stillborn) =36
11 have had 3 „ (one twins) =33
4 have had 4 „ =16
1 has had 5 „ = 5

126

1 woman has had triplets.
4 women have been married a second time; one having two children by her second husband.
369 have remained sterile.
329 women unmarried at the time of operation recovered.
70 of these have since married.
1 woman has been married three times.
44 of these married women have given birth to 99 children.
18 married women have, since operation, had 1 child (1 stillborn) =18
11 married women have had 2 children (one twins) =22
10 married women have had 3 children =30
2 married women have had 5 children (3 stillborn) =10
2 married women have had 6 children =12
1 married woman has had 7 children = 7

99

3 single women have had 1 child = 3

Making a total of 228 children born amongst 117 women after their recovery from ovariotomy.

Many in writing the report add that they are well and strong, or better than they have been for many years, or some such phrase, expressive of their complete restoration. A few complain of some trifling ailment. I know that a large proportion of those who filled up the returns in 1881 are still alive and well, and that other children have been born since; but as only 3 years have elapsed, I have not issued fresh circulars.

I have not been able to trace any peculiarity in the subsequent condition of patients who have recovered after removal of both ovaries as compared with those from whom only one was removed, except that, with only three exceptions, there has not been menstruation after recovery. One young unmarried woman became very florid and stout; but I have seen nothing like the excessive corpulence anticipated by those whose expectations were based on the effect of castrating domesticated animals.

I have ascertained from the husband or medical attendant of some of my own patients, that sexual desire and gratification have certainly not been less than before operation. In some cases, where only one ovary was removed, desire had been increased. One husband told me that his wife had been remarkably cold before ovariotomy, but was afterwards extremely amorous.

To the best of my knowledge this is the first time that any such extended inquiry into the subsequent history of patients who have recovered from a capital operation has been carried out. As a rule, in all statistical returns from hospitals, the bare fact of death or recovery is all the information that is given, and any attempt to follow up the successful cases afterwards is found to be excessively difficult. Some years ago, I endeavoured to ascertain what became of patients who recovered after amputation of the thigh. I had good reason for believing that many died within a year, but was never able to obtain anything like correct statistical information. The hospital reporters of the 'Lancet' once collected together particulars of all the cases in which amputation at the hip-joint had been performed for several years in London hospitals. A large proportion of the patients died within a day or two of the operation, and of those who recovered the only one alive a year after operation was a woman whose thigh I removed at the hip-joint, in the Samaritan Hospital, on account of malignant disease. It is well known that patients who have been cured of aneurism, either by ligature or compression, are very apt to suffer from the disease in some other artery; but it is left to some future inquirer, or some committee of collective investigation, to ascertain the frequency and date of such return of disease. We have a little more information as to patients who undergo lithotomy a second time. Most of the information ends with the immediate result of the operation, and but little is known of the subsequent history of the patient. I hope that what has been done in this respect with regard to ovariotomy, and latterly by Sir H. Thompson with regard to lithotomy and lithotrity, will not only be useful in enabling us to form a correct estimate as to the value of these operations, but will induce other surgeons to obtain similar information as to the subsequent history of patients who recover after amputation of a limb, excision of a large joint, ligature of main arteries, herniotomy, or trephining.

When a surgeon has removed a large diseased ovary and the woman recovers, he has in very many cases the great satisfaction of feeling that his patient has been restored to perfect health. Experience has proved that the remaining ovary generally carries on its functions, and that the woman may become the mother of healthy children of both sexes. The patient is not mutilated as by the amputation of a limb, nor does the general health suffer as it frequently does after the greater amputations. There certainly is nothing like the tendency to recurrence which there is after the removal of malignant tumours; probably by no means so frequent an occurrence of disease elsewhere as after successful ligature of a diseased artery, or disease of the opposite lens after successful removal of one cataract, or formation of a second calculus after a removal of one by lithotomy or lithotrity; and certainly no such prolonged suffering as from the chronic cystitis which not unfrequently follows these two operations.

The rule is, that by a successful ovariotomy the patient is restored to a state of health so perfect that she and her friends are as surprised as they are gratified. But there are exceptions to

this rule. In some cases a disease believed to be innocent proves to be malignant, soon recurs, and proves fatal within a few months, or even within a few weeks after apparent recovery. In other cases the ovary which is left untouched because it is believed to be healthy, or so slightly diseased that its removal is uncalled for, becomes the seat of disease. In what proportion of cases this occurs we have even now but little more information than may be found in this volume. It is only within the last 20 years that ovariotomy has been performed sufficiently often to furnish data for reliable statistics, and it is difficult to ascertain, even in some of these later cases, what has been the state of the patient's health a few years after operation. But it would be unreasonable to expect that in all cases the ovary left in the body would remain healthy. It is for future observation to decide how often and in what class of cases a recurrence of disease may be feared. The fact that in my practice there were 11 recurrences requiring a second operation out of 1,139 patients, gives a proportion of 1 in about every 100 cases, and, so far as I can make out, the character of the cysts was generally *proliferous*; at any rate, it was so in almost all the cases in which an accurate report has been kept of the character of the tumours. It is satisfactory, however, to learn that if the remaining ovary should become diseased, the first operation does not add to the difficulty of a second, and that the second ovariotomy has proved successful in 11 out of the 13 cases in which I have operated, and in the case in which Atlee operated 16 years after the first operation by Clay.

The rare exceptions to the general rule of complete restoration of health cannot be considered as invalidating the claim of ovariotomy to be considered as one of the greatest of surgical triumphs —relieving suffering, saving life, and restoring women doomed to inevitable death to good health.

PART II

UTERINE AND OTHER ABDOMINAL TUMOURS

CHAPTER I

UTERINE TUMOURS

After looking through much of the English, French, German, and American literature of the subject of uterine tumours, I may say that in the course of my practice I have met with, either among the cases upon which I have operated, or which have been under my treatment, or that I have seen in consultation, every variety of fibroid tumour described or figured by the writers. I have not observed any special peculiarities in the composition or structure of these tumours, and have always found them to consist of the same histological elements. The difference among the tumours has been more that of form, owing to the way in which those elements have been arranged. The main substance is white fibre tissue, merging on the one hand into the form of unstriped muscular tissue, on the other into that of connective tissue. The relative quantity of these tissues varies in all the tumours, and even in the different parts of the same tumour; and according as one or the other predominates, so do the remaining constituents become less conspicuous. In the simplest tumours, with little more than white fibre, the vascular, nervous, and lymphatic tissues are scanty; while in a tumour lobulated, and intersected throughout without connective tissue septa, the blood-vessels, lymphatics, and nerves are more abundant. In contrast with the papillomatous growths and cancerous degenerations which assail the uterus, they take their origin from the tissue cells, and are in no way epithelial. In the section of a simple fibroid tumour, or a lobule of a conglomerate tumour, the appearance of the distinctive part of which it consists is more like that of intervertebral fibro-cartilage than anything else, unless it be certain indurated conditions of the uterine walls themselves. When the tumours are small, and in their early stages, the fibrous elements have often a concentric arrangement round a single centre, and the same distribution may be traced in the nodules of the larger conglomerate masses. As might be expected from the abnormal character of these neoplasms, the histological elements are generally imperfectly developed, and the less they are developed the more abundantly are nuclei dispersed among them. The condition of the constituent parts of the tumour, and the rapidity and slowness of growth, depend very much upon the supply of blood. This in some cases is so small that the arteries are of diminutive size, and injections are with difficulty introduced into the substance of the tumour, though it occasionally happens that arteries large enough to cause great hæmorrhage are found distributing blood to all parts. The form of these tumours is in almost all cases at first round or pear-shaped. As they enlarge they become modelled by the parts with which they come in contact, and the direction of their growth is in a measure influenced by the resistance which they meet with from the neighbouring organs. It is seldom that they are solitary, and where there is a tendency to their formation it is common to find other growths of the same kind, either as offshoots from the parent tumour, or implanted on other parts of the same uterus. They are by no means uncommon, though not often formed at an

early time of life. My experience leads me to believe that none of the estimates of frequency during the period of sexual activity are exaggerated. I should be inclined to think them quite as common as cystic disease of the ovaries, perhaps more common, though fortunately neither so detrimental to health nor so rapidly fatal. The frequent, almost accidental discovery by women of their unsuspected existence, and their unlooked-for disclosure in post-mortem examinations, their sometimes temporary existence and spontaneous disappearance, and the effect of surgical treatment in causing their diminution or inactivity, all show how little prejudicial is their nature, and that much of the evil they cause is mechanical. As they are for the most part excrescences of a fleshy hollow organ, it is only natural that they should be found on the outer and inner surfaces, and sometimes imbedded in the muscular walls. In some cases the tumour is nothing more than a symmetrical overgrowth of the walls all round the uterine cavity, though these cases are seldom free from either sub-peritoneal outgrowths or sub-mucous ingrowths. The tumours growing either on the sub-peritoneal surface or projecting into the uterine cavity, although sessile when growth commences, are often in later stages of growth pedunculated, and receive their supply of blood through the pedicle. Most hard growths originating in the wall substance of the uterus are capsuled. The larger blood-vessels ramify in the capsule, those entering the growth itself being usually small. There is sometimes a special tendency to the formation of cystic cavities in the interior of these tumours. This cystlike condition has come under my notice with greater frequency than most other writers have recorded. Sometimes it has seemed to arise from a softening of tissue, especially in that kind of tumour, first clearly brought under notice by Barnes, which is chiefly seen in the body of the uterus, and is large, soft, of loose texture, without very distinct capsule, more vascular, often œdematous, less liable to calcareous degeneration, and generally the cause of metrorrhagia. In other cases their production has arisen from a process of cyst formation, such as that recognised in cystic disease of the breast and other organs. The character of the tumour depends very much upon that of the tissues of the part of the organ from which it springs, and it takes a solid or looser form, according to the density or looseness of the texture of the parent layers. Thus on the outside, attached to the cortical layer of the uterus, we find the hard, unsucculent tumours, tenacious of life, and lasting oftentimes till old age, even in a condition of degeneration. In the walls of the womb we find the soft, pulpy, vascular growths which have a tendency to inflammatory action and necrosis from injuries; and on the mucous side of the organ the quick-growing, bleeding excrescences which approach in certain respects to the hæmorrhagic condition of the erectile tumours occasionally found in this situation. In the recurrent form of fibroid tumours generally growing towards the cavity, there is some affinity with malignant disease, especially as to its tendency to reproduction if removed, and to secondary appearance in other parts of the body.

Of size, I have seen instances varying from that of a pea to some of enormous bulk and weight, filling up all available space in the pelvis and abdomen compatible with the continuance of the organic functions, and in one example of successful removal amounting to the weight of 70 pounds, with a measurement of 57 inches by 53.

The contour of the originally rounded nodules soon becomes modified by contact with the hard parts of the pelvis, and by the continued resistance of all that it meets in the course of its growth. The extension, of course, is most rapid in the direction where the obstacles are the least strong, and it would be useless to attempt to give an idea of the strange forms produced by external modelling, and the varying degrees of nutrition depending upon changes in the vascular condition of the interior. The external appearance of the conglomerate tumours is affected by the same causes, and they are equally multiform.

The life history of these structurally orthodox excrescences, when not complicated by accident or induced functional derangement, is simple enough. They commence their existence at a time when the organ which they affect is in a state of high functional activity, they participate in its periodical variations, increase with its accessions, slacken growth with its torpidity, and if nothing happens to

check the even tenour of their progress they often dwindle away with the cessation of sexual life, or submit to one of those comparatively innocent forms of degeneration which we know as fatty transformation and calcification. This petrifaction, it must be remembered, has no relation to the organising tendency of the process of ossification, but consists in a mere interstitial deposit of calcareous matter, which replaces the living tissue and remains a foreign body lodged in the abdomen as a peritoneal calculus, sometimes to extreme old age. It is the study of this life history which has led logically to the modern surgical treatment of some kinds of these tumours, and the amount of success which has attended it would induce one to hope, if not to believe, that when the physiological and pathological conditions attending the rise and progress of some other tumours have been investigated in the same philosophical spirit, and with as much perseverance, corresponding means may be found of holding them in check or causing their suppression.

But the life of these tumours is subject to too many accidents and interferences for this course and termination to be the rule. It is rather the exception, as much so as centenarian duration is in human existence. Still, there are other modes in which early involution has been brought about. It has been observed after delivery, and to correspond with the process of involution of the womb. And with the organ unimpregnated I have many times noted the disappearance of these tumours, which, though doubted by some, has been well attested. It is owing probably to the arrest of nourishment by diminution of the vascular supply, and the attendant retrograde changes of fatty degeneration and absorption, or more or less continuous discharge of débris from the uterine cavity, after menstrual influence ceases. At any rate, the atrophy of these tumours from time to time, either without interference or under medical treatment, is a pathological fact. Then there is another way in which the uterus rids itself of the mural excrescences, and it is easy of comprehension. The presence of the interstitial growth causes hypertrophy of the uterine wall. Its force is increased, and when the pressure of the growth has gone on to such an extent as to occasion absorption of the intervening substance and ulceration of the mucous lining, this force may be called into action by some occasional stimulus, and the expulsive power is sufficient to enucleate the whole mass, and drive it out not only from its seat, but into the uterine cavity, or even into the vagina. It is doubtful whether these uterine fibroid tumours ever undergo cancerous degeneration. There is no reason why this tissue should be exempt from such a process, but the records of it are so rare that it is virtually regarded as a termination not to be looked for. There is nothing known as to the causes of the development of these tumours, and the peculiarities of temperament or bodily constitution which give a tendency to their formation are not understood so well as the conditions which conduce to their disappearance.

In many cases these tumours exist for a long time without being discovered, and still more frequently they cause only discomfort without injury to the general health. When bulk and weight increase they produce the same local symptoms as other tumours in the same situation, but still without the same amount of constitutional derangement. Yet when the pressure becomes excessive the organs encroached upon must suffer, and the symptoms depend upon the direction in which the tumour is acting. There may be difficulty with the bladder, and there may be pressure on one or both ureters, and suspension of the renal function. Nutrition may be arrested, and all that depends upon the proper action of the alimentary canal may be at fault. There may be incessant variations of nervous symptoms, and in some cases excessive pain from nerve pressure. The uterine troubles assume an infinite variety of forms, including spasmodic action, discharges, and hæmorrhages, accompanied with the well-known sympathetic affections of distant parts and responding organs. Of course the symptoms depend much upon the position and character of the tumour itself. Usually with the subperitoneal tumours the hæmorrhage is not much, but the tendency to ascites greater. The sub-mucous variety, on the contrary, is more likely to be attended with profuse bleeding. And in cases where the bleeding is not only profuse but persistent, we may expect to find the cause in a tumour, probably of no great size, of the lower part of the body of the uterus, or of the

cervix. The inter-menstrual secretions are not much affected, though sometimes leucorrhœal discharges become troublesome. Menstruation is more frequently than otherwise rendered difficult and superabundant, while in some instances there is a more or less marked condition of amenorrhœa. Fecundity is generally diminished, but conception is not rendered impossible. Few women with these tumours have large families, partly owing to the predisposition to miscarriage under such circumstances. But I have known several patients with uterine tumours who have become pregnant, have gone on to the full term, and have borne living children. In some of these the tumour has disappeared, more or less entirely, within a few weeks or months of the delivery. In 3 cases repeated pregnancies have occurred without much change in either the uterus or the tumour. In one of these the tumour was so large that it was mistaken at the labour by an experienced accoucheur, after the birth of the child, for a second child.

It is only since ovariotomy has become a familiar operation that the fact of uterine tumours frequently attaining a very large size has become generally known. Even now I am often told by men of great experience that a tumour must be ovarian because it is too large to be uterine. They have never seen nor heard of any such enlargement of the uterus, and are astonished when I say that the largest abdominal tumours I have ever seen have been fibroid or fibro-cystic tumours of the uterus.

In one of the earliest attempts to perform ovariotomy in Great Britain, in 1825, Mr. Lizars fell into this error of diagnosis. He opened the abdomen and found a large uterine tumour. And the first tumour supposed to be ovarian which was removed in London—by Dr. Granville, in 1827—proved to be a fibroid tumour of the uterus, weighing 8 pounds. Of the 8 first published cases by Kœberlé of removal of uterine tumours by gastrotomy, in only 3 was the diagnosis of uterine tumour made accurately before operation. In 2 the diagnosis was doubtful, and in 3 the tumour was believed to be ovarian. In fact it has happened to many surgeons, and to myself among the number, that we have commenced operations as ovariotomy, and even removed tumours from the abdomen, under the impression that we were dealing with diseased ovaries, when, upon examination, they have proved to be pedunculate fibroid outgrowths from the uterus. At first, when it was discovered that a tumour was uterine, it was left alone. Then, if pedunculate, it was removed. It is only of late years that large solid uterine growths, not pedunculate, have been operated on designedly.

The revival of ovariotomy between 1858 and 1865 led, in the words of Paget, to 'an extension of the whole domain of peritoneal surgery.' This extension, naturally enough, began with the removal of uterine tumours.

In my first work on 'Diseases of the Ovaries,' published in 1865, I have recorded cases where I removed large uterine tumours containing solid fibroid masses many pounds in weight, and cyst-like cavities containing more than 20 pints of fluid, these tumours being so far pedunculated outgrowths from the peritoneal surface of the uterus that the mobility of the cervix uteri was free, and no enlargement of the uterine cavity could be detected by the sound.

THE DIAGNOSIS OF UTERINE FROM OVARIAN TUMOURS

is a difficulty which frequently arises in practice, which may often be solved with great ease, which as often requires much cautious investigation, and which in some cases can only be cleared up by an exploratory incision.

It is quite certain that both uterine and ovarian tumours may lead to very great enlargement of the abdomen, and I can add from my own experience that the tumours may be central in position, or inclined to one or other side; either round, ovoid, or irregular in form; smooth or lobulated on their surface; either hard, or elastic, or fluctuating; either tender or insensible to pressure; and either adhering to the abdominal wall or moving beneath it with or without crepitation.

It is also certain that there is nothing in the *history* of a doubtful case which affords any very decisive assistance in diagnosis; for, although the increase of ovarian tumours is often rapid, it is almost as often slow; and if the increase of uterine tumours is generally slow, it is not unfrequently rapid. Uterine hæmor-

rhage, either in the form of excessive menstruation or of flooding at irregular intervals, is certainly more common in uterine than in ovarian tumours, but is occasionally associated with the latter. Probably the rule is that menstruation is scanty when a tumour is ovarian, and excessive when it is uterine; but exceptions to this rule are numerous, and discharges of albuminoid fluids from the vagina at variable intervals are common in both classes of tumours.

So with the *age* of the patient. Perhaps uterine may be more common than ovarian tumours in old persons, and ovarian more common than uterine tumours in young persons; but it is certain that both uterine and ovarian tumours are common in single, married, and widowed women at all ages after puberty, and in all conditions of life.

Both are also observed in some women who are extremely fat, in some who are otherwise healthy and well nourished, and in some who are extremely emaciated; and there is a facial expression common to women suffering from both classes of tumours, associated commonly with a very florid complexion when the tumour is uterine. In the majority of ovarian cases the complexion is pallid; but in some cases, where the patient is fat or well nourished, the complexion may be florid.

Remembering the numerous exceptions to all the rules just stated, we may now inquire what may be learned by the eye, the touch, and the ear, in an examination of the abdomen; in other words, what are the signs afforded by inspection and measurement, by palpation, and by percussion and auscultation, which are of value in diagnosis. The results of this inquiry may be arranged in the following order:

INSPECTION

1. Visible enlargement of the abdomen is more often *general* in cases of ovarian tumour, and *partial* in cases of uterine tumour, being confined to the lower part of the abdomen until a very large size has been attained.

2. The depression of the umbilicus is diminished, or the umbilicus may become prominent in large ovarian cysts. This is rarely seen in uterine tumours unless fluid is also present in the peritoneal cavity.

3. Enlargement of the superficial veins of the abdominal wall, and œdema of the abdominal wall and of the lineæ albicantes, are more general in uterine than in ovarian tumours of moderate size, but are not uncommon when ovarian tumours have attained a very large size.

4. When the abdominal wall is thin, both uterine and ovarian tumours, if not very closely adherent to the abdominal wall, may be seen to move downwards as a recumbent patient inspires, and upwards during expiration, falling downwards and forwards as she sits or stands, and more or less to either side according to the inclination of her body. But nearly all uterine tumours, though visibly moving above, seem to be fixed below in the hypogastric region.

5. When a recumbent patient attempts to sit up without aid from any other than the abdominal muscles, the recti are seen to bulge forward in front of a tense non-adherent ovarian tumour or with a flaccid adherent cyst. This is seldom well marked in uterine tumours, a solid mass fixed centrally below the umbilicus interfering with the free action of the recti.

MEASUREMENT

6. Increase in the circular measurement of the abdomen is usually greater on one side than the other in ovarian tumours. In uterine tumours the increase is more often symmetrical. In both classes, vertical measurement shows the distance between the pubes and the sternum to be increased. But very great proportionate increase of the space from the pubes to the umbilicus is more common in uterine than in ovarian tumours.

PALPATION

7. Large masses of apparently solid matter, and smaller masses or nodules of very hard or bonelike substance, are sometimes observed in ovarian tumours. But it is excessively rare to find such solid portions *preponderating* in an ovarian tumour. As a rule, the fluid or cystic portion is the larger, the hard or solid portion the smaller, in ovarian tumours. In uterine tumours, on the contrary, the solid is the larger, the fluid the smaller portion.

8. The mobility of ovarian tumours is generally greater from below upwards

than that of uterine tumours, unless the latter are distinctly pedunculated. If one hand be pressed backwards between the tumour and the pubes, an ovarian tumour can generally be raised considerably, and the hand can sometimes be pressed backwards almost to the brim of the pelvis; while a tumour which involves the body and neck of the uterus cannot be raised at all, or only with difficulty, and the hand cannot be pressed down between the pubes and the tumour.

9. When there is fluid free in the peritoneal cavity, and a hard tumour can be felt on displacing this fluid by sudden pressure, the tumour may be either uterine or ovarian. If the tumour be very hard and the quantity of fluid small, the tumour is probably uterine and the fluid ascitic. An ovarian tumour which has given way, and emptied one or more of its cysts into the peritoneal cavity, is seldom hard or well defined in outline, and the quantity of fluid is often so large that the size and shape of the tumour cannot be ascertained until after removal of the fluid by tapping. The characters of the fluid will then complete the diagnosis.

PERCUSSION

10. As percussion elicits a dull sound all over both uterine and ovarian tumours, which dulness ceases abruptly at the border or outline of the tumour in all positions of the patient—except in the rare cases where a cyst contains gas, or where a coil of intestine is adherent in front of a tumour—percussion cannot afford much aid in distinguishing ovarian from uterine tumours.

AUSCULTATION

11. In ovarian tumours the impulse from the aorta is often perceptible, and a sound sometimes accompanies the impulse. The sounds of the heart are rarely transmitted, and any distinct vascular murmur is excessively rare. But in about half the cases of uterine tumours which I have examined some variety of vascular murmur may be heard. In some cases the murmur is tubular, in others vesicular, and sometimes a tubular and a vesicular murmur may be heard in different parts of a uterine tumour. These murmurs are synchronous with the pulse. They may vary in intensity with the amount of pressure by the stethoscope, and may disappear on very firm pressure. Common in uterine, very rare in ovarian tumours, vascular murmurs are valuable aids in diagnosis.

EXAMINATION BY VAGINA AND RECTUM

Having thoroughly examined the abdomen, the pelvis is next to be examined by the vagina and rectum, and a conjoined examination of the tumour by the abdomen and pelvis should also be made.

Examination of the vagina may at once remove all doubt, by showing that the os and cervix uteri are in a healthy state, that the uterus is normally mobile, that its cavity is neither elongated nor shortened, and that any tumour felt through the vaginal wall is independent of the uterus. In such a case the tumour is almost certainly ovarian. On the contrary, we may find the vagina more or less completely obliterated by a solid mass, the cervix uteri gone, the os reached with difficulty, the cervical canal so closed or distorted that the uterine sound cannot be passed, or the cavity may be so enlarged or elongated that the sound may pass many inches beyond the normal length. Here the tumour is almost certainly uterine. The sound may also give valuable information as to the extent of the connection of the ingrowth with the wall of the cavity.

But it must be remembered that considerable peritoneal outgrowths, or large growths within the walls of the fundus or body of the uterus, have been observed, while the uterine cavity has remained unaltered in dimensions and the cervix in structure. And, on the other hand, the cervix may be drawn up out of reach, or the whole uterus may be elongated, when the connection with an ovarian tumour is close; or the lower portion of an ovarian tumour may be so moulded to the true pelvis that the uterus is pressed upwards and forwards, or flattened behind the pubes, so that the tumour and the uterus are either really or apparently inseparable from one another. Abnormal arterial impulse in the vagina and cervix uteri may be felt in both classes of tumours. In one case I found during the operation that the pulsations at the base of a uterine tumour arose from some large vessels in a portion

of omentum which had contracted adhesions low down. The pulsating omental vessels had been felt through the vagina. But I have never felt the vascular thrill like that of varicose aneurism, occasionally felt in the lower segment of a fibroid uterus, in any ovarian tumour. I have felt this thrill in some 20 to 30 cases, and thought it of some value in the differential diagnosis between uterine and ovarian tumours, but I never suggested that the thrill was due to the presence of an aneurism. Yet Dr. Bailey, of Louisville, Kentucky, furnished me with a curious exemplification of the ease with which even intelligent commentators may put different interpretations upon the simplest bit of text when they overlook the context. In consultation with other eminent practitioners, he saw a patient who for 8 or 10 years had had fibroid tumours of the uterus, and he wrote to me thus: 'Latterly a new feature occurred in the case. All the phenomena of an aneurism appeared in the lower segment of the uterus. A purring thrill could be heard and felt very distinctly indeed. Several very prominent gynæcologists unhesitatingly pronounced it aneurism. Upon the paragraph quoted from your work I stated that you taught that the phenomena of varicose aneurism occurred in the lower segments of fibroid uteri witnout there being aneurism. Did I interpret your language correctly? Dr. Atlee, of Philadelphia, as well as the other eminent gentlemen, maintained that you merely expressed the idea that fibroid uteri had a pulsatory thrill in their lower segments that was not found when the tumours were ovarian. Now while this is true, I claimed that your language taught more than this—namely, that the lower segments of fibroid uteri occasionally gave out all the phenomena of varicose aneurism when there was no aneurism, and that this was not the case with ovarian tumours.

'Dr. Atlee performed gastrotomy, and as the shock and loss of blood lost to him the patient upon the table, the dissection of the tissues where the aneurismal phenomena had presented themselves demonstrated no aneurism. So if I have interpreted your teachings aright they have in this case received additional support.'

In order to prevent any further misreading of my words, in which, however, I can see nothing equivocal when taken in their connection, I may notify that I fully accept Dr. Bailey's construction, and gladly add his case as an illustration of the truth of what I wrote.

The vaginal walls may be so depressed, when there is much fluid free in the peritoneal cavity surrounding either a uterine or an ovarian tumour, as to form a vaginal rectocele, more rarely a vaginal cystocele. And the uterus may either remain above the brim of the pelvis if greatly enlarged, or if fixed by adhesion; or it may prolapse with the vagina, the os appearing at the most depending part of the protrusion. Here the uterine sound will generally remove all doubt; for if the dimensions of the uterine cavity are normal, and the weight of the uterus is not increased, the tumour can hardly be uterine. And a uterus which is not much enlarged can generally be pushed up to its normal position.

In some cases where the uterus is much elevated, it may be felt through the abdominal wall above the pubes, while the os uteri cannot be reached by the vagina. The urethra may be elongated or drawn to one side, and the bladder may also be displaced. If the abdominal tumour and the pelvic portion of the tumour fluctuate, while the uterus does not much exceed its normal dimensions, it is almost certain that the uterus is adherent to, and is elevated by, an ovarian tumour.

Examination by the rectum may show that the uterus preserves its normal size, shape, and position. Or it may be displaced by some tumour above or in front of it, and one or both ovaries may sometimes be felt. This, however, is not very common if they are not enlarged nor lower in the pelvis than usual. By one finger in the rectum and another in the vagina, the consistence, form, and size of any intervening structure can be ascertained and valuable information so obtained. And if the sound be passed into the uterine cavity, and examination then made by the rectum, it is often easy to ascertain whether any solid or fluid tumour is situated between a normal uterus and the rectum, or whether the uterus is fixed and its posterior part enlarged.

When a tumour can be felt in the pelvis by vagina and rectum, as well as in the abdomen by the abdominal wall, simultaneous examination will be required to ascertain if there is more than one

tumour, and if the uterus is independent or not. Pressing one finger firmly on the cervix uteri, and moving the abdominal tumour with the other hand from side to side, then upwards and downwards, the uterus may be felt to remain almost unaffected by the movements of the tumour, or only to receive some transmitted movement as the pelvic portion of the tumour moves. Here the strong probability is that the tumour is ovarian. On the other hand, every movement of the abdominal tumour may be communicated immediately to the uterus, which is felt to move in all directions with the pelvic portion of the tumour. If this portion is solid, it is almost certain that the tumour is uterine.

Cases are sometimes met with where ovarian tumours and fibroid tumours of the uterus are both present at the same time. Small uterine fibroids are often observed when the only important tumour is ovarian. I have seen a large cyst of one ovary and a large uterine fibroid coexisting. I have twice seen tumours of both ovaries present when the uterus was enlarged by fibroids, and several cases where both uterus and ovaries were simultaneously affected by malignant disease. In Case 979, I removed an ovarian tumour weighing 7 pounds, and a fibroid outgrowth from the uterus weighing 2 pounds. And in 1882 I removed a dermoid tumour of the left ovary, and a fibroid outgrowth from the right side of the uterus. Both these patients were young unmarried women, and both recovered.

EXPLORATORY INCISION

If these possible complications be borne in mind, such an examination as I have suggested will in most cases suffice to establish an accurate diagnosis between uterine and ovarian tumours. In some cases doubt may still remain, and exploratory puncture or incision will then be necessary. When a uterine outgrowth is not entirely solid—but partly solid and partly fluid or cystic—forming a fibro-cystic tumour—the diagnosis is still more difficult. A case of fibro-cystic tumour of the uterus was reported by me in the 'Dublin Quarterly Journal of Medical Science,' Aug. 1864. The report has been reprinted in each of my works on diseases of the ovaries. Although practically important, and historically interesting, as a sort of landmark indicating one stage in the settling of the principles of our diagnosis, and the date at which it became generally known that fibro-cystic tumours of the uterus could contain so large a quantity of fluid as to bring them into diagnostic comparison with ovarian cysts, and marking the limits of safety in any operative proceedings undertaken either for determining the nature of the growth or the possibility of its removal, it is unnecessary now to repeat all the details. The patient was a single lady, 45 years of age, with the abdomen enormously distended, measuring 56 inches in girth at the level of the umbilicus, 19 inches from the ensiform cartilage to the umbilicus. The skin covering the umbilicus was distended by fluid simulating an umbilical hernia. Above the umbilicus fluctuation was very evident; but the fluid was evidently free in the peritoneal cavity, and covered a solid or semi-solid tumour that could be felt on displacing the fluid by deep pressure.

I first tapped above the umbilicus, and removed about 30 pints of clear rather viscid fluid. After removing the canula, and closing the small opening, I made an incision below the umbilicus about 6 inches long, and exposed what appeared to be 2 ovarian cysts separated by a deep fissure. I tapped that on the left side, and about 10 pints of bloody serum escaped; 2 or 3 pints more of similar red fluid escaped after puncturing again within the cyst first opened, by pushing on the trocar without removing the canula. The tumour was then withdrawn, and found to have 2 attachments —one above to the tumour on the right side, and one below to the uterus. The former attachment was broken through, and 2 bleeding vessels on the torn surface of the right tumour were secured by silk ligatures. The left broad ligament was then transfixed, tied in two halves with strong silk, and the tumour was cut away. It then became a question what should be done with the tumour on the right side; and, looking to its great size, solidity, evident close connection with the transverse colon and with the omentum, which contained some enormously distended veins, it was decided that no attempt to remove this tumour should be made, especially as the patient was becoming very feeble. The wound was

accordingly closed and the patient placed in bed. Brandy was administered freely; but she never rallied nor recovered consciousness, and died about 3 hours after she had begun to take chloroform.

The tumour which I removed weighed about 20 pounds, and was almost entirely solid. It consisted of fibrous tissue, everywhere permeated by large blood-vessels, and in several places there were blood cysts, the size of a barley-corn to that of a pea. The largest cyst was at the superior extremity; it was about the size of an adult head, and its internal surface presented traces of having primarily been divided into several compartments.

The tumour which we did not attempt to remove was found after death to consist partly of a cyst and partly of a fibro-cystic tumour. The cyst was spherical, about a foot in diameter, empty, and it adhered to the anterior abdominal wall and to the transverse colon; the fibroid mass measured 18 inches in length, 16 inches in breadth, and near its centre fully 7 inches thick.

The walls of the uterus were of normal thickness. From the fundus sprang a fibrous column, 5 inches long, 3 inches deep, and $1\frac{1}{2}$ inch broad, encircled at its upper extremity by a ligature. The left side of this fibrous column presented a roughly cut surface, 5 inches long and 3 inches broad or deep, being the point at which the tumour first described had been cut through at the operation.

In the 14th volume of the 'Transactions of the Pathological Society of London,' p. 204, may be found a short account of a fibro-cystic tumour of the uterus which I removed from a single lady, aged 53, on April 30, 1863. 'One large cyst had held 26 pints of fluid and 4 pounds of fibrine; and there was a solid mass, which weighed more than 16 pounds. It was not until after post-mortem examination that the true nature of the case was discovered. Given a large semi-solid tumour, fluctuating in some parts, containing cysts holding upwards of 20 pints of fluid, moving beneath the abdominal wall, the uterus being movable, and not enlarged so far as measurement by the sound can detect, no sound or arterial impulse to be heard which is not often heard in ovarian tumours, and no history of hæmorrhage leading to a suspicion of uterine disease —and it will be admitted that these characters of the two fibro-cystic tumours of the uterus which I removed so closely resemble those of semi-solid ovarian tumours, that diagnosis must be very uncertain. Even after an exploratory incision, I know of nothing but a rather darker—less pearly—aspect of the tumour which would put the surgeon on his guard. In any doubtful case it would be well to tap the largest cyst and examine the fluid. In both the above cases, as in others since, this was peculiar—not the viscid mucoid fluid of multilocular ovarian cysts, but a thin serum, with 5, 10, or 15 per cent. of blood intimately mixed with it, and not separating until after standing for some hours. In this way I have satisfied myself, in several cases, that tumours, which others considered to be ovarian, were really fibro-cystic uterine growths. If the operation has been commenced, and the dark aspect of the tumour is observed, it would certainly be advisable not to do more than tap one or more of the largest cysts before examining attentively the connections between the uterus and the tumour. If these should prove to be very intimate, it will be the unpleasant duty of the surgeon to desist from any attempt to do more, and to close the wound as soon as possible.' We shall see presently how recent experience modifies this last sentence.

MEDICAL TREATMENT

There is more time for the treatment with patients suffering from fibroid tumours of the uterus of moderate size than with those who are subject to the more rapid course of ovarian cysts. Even when the symptoms are urgent we have time to try a variety of medical resources, not only for the relief of symptoms, but with some hope of arresting growth before resorting to surgical measures for extirpation. When the tumour has attained a considerable size, one of the first things which strikes us is the distress arising from the pendulous state of the abdomen. We get rid of this trouble at once by a suitable bandage or apparatus, and put the patient at comparative ease. The support, too, may be carried to an extent sufficient to steady the tumour, and to prevent the pain caused by its rolling, and falling upon the sensitive viscera with which it

comes in contact as the patient moves about. But beyond this protection pressure is useless, and it is generally in vain that it is employed to get any amount of absorption; to say nothing of the aggravation of other symptoms by any great degree of constriction. Without this girding, the weight of the tumour pressing upon nerves, vessels, and the abdominal organs is enough to cause distress, for which we have to find means of relief. We sometimes meet with the most excruciating sciatica when the tumour sinks down in the pelvis, and the pain can only be moderated by changes of position, and dislodging the mass from the place where it has become impacted. Without such manual interference embrocations and subcutaneous injections are thrown away. We must deal in the same way with any other part which is the seat of neuralgia from the same cause. At the same time, we are doing as much as possible to remove the vascular obstruction which is giving rise to congestion and œdema, though it will often be found that bandages on the lower limbs, when they are much swollen, are an additional means of comfort to the patient. With the presence of a foreign body, such as one of the fibroid tumours, encroaching upon the space duly adjusted for the joint occupation and action of the several abdominal viscera, some or all of them must needs be interfered with and their functions embarrassed. Thus we see produced all the evils of lymphatic engorgement, of impeded intestinal action, of renal and vesical irregularity. We may have to exert all our ingenuity to disengage the lymph channels, to assist imperfect digestion, disperse flatulence, moderate spasmodic pains, overcome constipation, and take off tenesmus—all which things, together or alternately, make life a torment. Pancreatic and hepatic difficulties are often very marked, and need to be attended to. The bladder symptoms sometimes become distressing, and pressure in the ureters may suspend kidney function and give rise to the well-known symptoms. Beyond these troubles of the mechanism of organic life, we may find the vital organs of the thorax no less affected, and when we come to add the host of miseries from diverse reflex action, there is an ample field for the art of relieving medicine to show its powers. Then the whole range of constitutional effects have to be considered, and everything compatible with the circumstances and condition of the patient must be done to maintain the general health, since the better the condition of the patient the less rapid will be the development of the embryonic tissues forming the tumour. Change, moral support, sedatives, tonics, nourishment, must all be regulated according to circumstances. The loss of blood, generally aggravated periodically, is one of the most serious consequences of fibroid tumours, especially of those ingrowing or seated in the walls of the uterus. This has to be restrained. The most important matter here is rest, and this ought to be absolute. Some surgeons trust very much to dilatation of the cervical canal, or to the effect of incisions, followed by the application of styptics. Of these there are many; none, perhaps, better than the preparations of iron. Sometimes it may become necessary to plug the vagina or to use injections. At the same time, internal remedies of the same character can be given with advantage. Most men have, after a time, their preferences, and familiarity with the use of certain agents often gives unexpected power in the use of them. I have frequently tested the long-continued employment of the perchloride of mercury with bark, and I believe the good results from it are mainly due to its action on the digestive organs, and to its effect in restoring and keeping up the general health. It conduces, too, as much as anything, to what we may hope to do in the way of cure—that is to say, in checking the growth, or promoting the absorption, of the tumour. With this end in view, I have also given chloride of ammonium, alone or with the bromide, for a long time, and in many cases with apparent benefit. A great variety of absorbent remedies have been suggested, but from none of them can any good be expected. The subcutaneous injection of ergotine or of sclerotic acid is said to have brought about a diminution of size, while at the same time it controlled the hæmorrhage, and, by giving the patient comfort, enabled her to gain health and strength. Ergot, in the form of liquid extract, given internally, acts in the same way. Wonderful reports have also been made of the effect of the Kreuznach and Woodhall Spa waters, and even of the home use of the salts obtained from them, and one may suppose that there is some truth

therein, or the popularity of the springs would not have outlasted the common duration of credulity. At one time the artificial petrifaction of the tumour by the continued administration of chloride of calcium, in imitation of the natural process of calcification which occasionally takes place, seemed to promise a chance of success, at least in arresting the growth of fibroid tumours; but the equal affinity of the arterial coats for this substance brought patients into a serious dilemma, and it seemed better for them to go on struggling for life with a non-malignant parasite, than to run any risk of losing it by the failure of a damaged circulating apparatus.

Tumours not projecting into the cavity of the uterus are no bar to marriage. A pregnancy may even give the chance of getting rid of the tumour by an involution coincident with that of the uterus after delivery.

SURGICAL TREATMENT

This may be most conveniently discussed in detail according to the varieties of the tumours to be operated on in the following order: 1st, fibroid or fibrocystic sub-peritoneal outgrowths; 2nd, mural or interstitial growths; 3rd, ingrowths. The alternative practice of removing the ovaries instead of the uterine tumour will afterwards be considered.

INDICATIONS FOR MYOMOTOMY

Before considering the methods of operating in these three classes of cases, the surgeon has to decide whether any operation should be recommended, or whether the patient should be advised to wait either until some clear necessity for relief removes all doubt, or until the ordinary changes in the uterus which follow the cessation of the catamenia are accompanied or followed by diminution in the morbid growth and by the disappearance of the distressing symptoms depending upon it. Here ovariotomy and myomotomy stand upon very different grounds. I adopt the word 'myomotomy' because, without being etymologically accurate, it is becoming pretty generally received as a convenient term for the removal of uterine tumours. With some rare exceptions, ovarian tumours, if not removed, kill the patient within 4 years. Innocent uterine tumours, on the contrary, may persist for many years almost without the knowledge of the patient, are often discovered quite accidentally, and as age advances disappear more or less completely, without shortening life or leading to any important affection of the general health. It is only when accompanied by free bleeding or by the formation of ascitic fluid that uterine tumours of moderate size, and not rapidly increasing, should be operated upon in any way; or when pressure on intestine, bladder, uterus, or nerves causes symptoms which can only be relieved by removal of the tumour; or the case is complicated by pregnancy. When a uterine tumour attains a very large size, the suffering caused by its weight and pressure, and by its interference with the respiration, is sufficient to justify operation at even great risk. Putting aside cases where the great size of the tumour is the only indication for operation, the other indications for the removal of tumours of moderate size are either their rapid increase, some inflammatory or other changes in the tumour causing fever, profuse bleeding, peritoneal irritation with ascitic effusion, or local consequences depending directly upon pressure. At the present day, the indications for the operation have to be considered under very different estimates as to the probable results of its performance than could have been calculated upon 20 years ago. Up till about the year 1865, when ovariotomy was beginning to be accepted as a legitimate surgical operation, uterine tumours were scarcely ever removed designedly. The rule was, that when a surgeon, performing what he expected to be ovariotomy, found that he had made a mistaken diagnosis, and was unexpectedly called upon to deal with a uterine tumour, he should desist. In many cases he desisted. The wound was closed. But in some exceptional cases tumours were removed, and as the numbers of such cases increased, technical details in the mode of operating were learnt. Kimball's operation in September 1853 appears to be the first in which any surgeon, having made an accurate diagnosis, undertook to remove the tumour with a distinct knowledge of what he had to do. His operation was followed by the recovery of the patient. The work of Péan and Urdy, on 'Hystérotomie,' published in

1873, probably contains the first systematic account of the mode of removing fibroid and fibro-cystic uterine tumours. The history of this operation is by them divided into 3 very distinct periods. In the first, before 1843, surgeons, meeting in the abdomen with uterine tumours instead of the ovarian tumours they expected, shrank from the consequences of proceeding, and did not complete the operation they had begun. In the second period, from 1843 to 1863, which Péan calls the stage of essaying and groping—'période d'essais et de tâtonnements'—and when ovariotomy had found numerous followers, some surgeons, finding themselves after an error of diagnosis in the presence of a uterine tumour, improvised the operation, although everything had been prepared for an ordinary ovariotomy. This is true only to a certain extent, for in Sept. 1861, in a case where before operation I had been doubtful as to diagnosis, and went prepared either to perform ovariotomy, or to deal with the suspected contingency of a uterine fibroid, I removed a solid uterine tumour weighing 27 pounds, with both Fallopian tubes and both ovaries; and in January 1863 I enucleated a solid tumour weighing 16 pounds, previously known to be a fibroid outgrowth from the uterus, after a very accurate diagnosis had been made in a careful consultation and with a full explanation of the unknown risk to the patient. In another case, in 1863, I took away a fibro-cystic tumour weighing 46 pounds. The third period dates from April 1863, when Kœberlé, in a case of doubtful diagnosis, prepared himself for either contingency, and decided, before he began the operation, to remove the whole of the tumour, even if obliged to perform a supravaginal amputation of the uterus. In 1866 he operated 3 times in cases where, sure of his diagnosis, he designedly performed hysterotomy; and it is claimed for the distinguished surgeon of Strasburg, that to him the honour is due of having first performed amputation of the uterus deliberately, and with a full knowledge of his case. The latest returns of Kœberlé's practice are given by Bigelow up to 1882 as 19 operations—9 recoveries and 10 deaths. Péan's first case was in 1869—the first successful case in Paris. This was a fibro-cystic tumour, and it was not until 1871 he removed a solid fibroid. Up to Feb. 1872, Péan had operated upon 9 patients, 7 of whom recovered. Before July 1881, according to Bigelow, Péan had had 51 cases, with 33 recoveries and 18 deaths.

The later results of the German operators, Hegar, Kaltenbach, Schroeder and Olshausen, as having done amongst them the greater part of the operations in their country, enable us to form some comparison between the results of myomotomy when the treatment of the pedicle, or connection with the uterus, is extra or intra-peritoneal, and when elastic or other ligatures are used. In the latest publication which I have seen, that of Hofmeier, published in 1884, he gives the results of 100 operations by Schroeder, all, with one exception, with intra-peritoneal treatment. Of 21 cases where the tumours were removed without opening the uterine cavity, there were only 2 deaths; of 58 cases where the uterine cavity was opened there were 18 deaths; and of 20 cases of enucleation of the uterine tumours there were 12 deaths; making in all 100 cases, with 32 deaths. Hofmeier gives the results of Hegar and Kaltenbach's operations up to Sept. 1881, as 12 cases, with only 1 death; of Kaltenbach's only, up to 1883, as 10 cases, with only 1 death; of Billroth's, to 1882, 25 cases—10 recoveries and 15 deaths; and Olshausen's, to 1884, 29 cases—20 recoveries and 9 deaths. But all these latter numbers were taken from Bigelow's table in the 'American Journal of Obstetrics,' which table certainly requires correction.

Indeed, the whole of the inquiry as to results of operation upon the uterus for fibroid tumours by different operators and by different methods, either in Germany, France, Great Britain or America, leads to the conclusion which Schroeder, in his preface to Hofmeier's work, has expressed, 'that while ovariotomy may now be looked upon, except as regards possible advance in minute details, as a closed chapter, myomotomy, on the contrary, stands exactly in the opposite position.'

I perfectly coincide with what Schroeder says, and without venturing to lay down any distinct rules for practice, will proceed to illustrate different modes of operating by narrating part of what I have done myself. The whole group shows that the operation is more successfully done now than formerly, and that, when the tumour can be removed

without opening the uterine cavity, a better hope of recovery may be entertained than when the cavity must be cut through.

THE OPERATION OF MYOMOTOMY

For every patient about to undergo the operation of myomotomy, the same preparation must be made, and the same precautions observed, as for ovariotomy. The patient is placed on the table, as shown on page 76, and the instruments are arranged in the same manner. The trocar is only necessary when the tumour is fibro-cystic. The instruments required, not usually taken to an ovariotomy, are the pins, wire constrictor, or a large clamp, to be ready in case the extra-peritoneal method is selected, iron or copper cauteries, or Paquelin's cautery, the cautery clamp, and a supply of elastic ligatures of different sizes.

Except in cases of small solid tumours, or cases in which considerable cystlike cavities may be emptied, the incision will usually be much longer than in ovariotomy; probably extending 2 or 3 inches above the umbilicus, possibly quite up to the ensiform cartilage. Even more caution than in ovariotomy is necessary at the lower angle of the incision, as the bladder is very apt to be pushed or drawn up towards the umbilicus. I have never followed the practice of Péan in what he calls 'morcellement,' or dividing the tumours into several parts before extraction, in order to render a long incision unnecessary. This was a very long and tedious process, and the prolongation of the operation and the greater loss of blood appeared to me far to outweigh any advantages gained by diminishing, by a few inches, the length of the incision. Still it is not always necessary to carry the incision to the extreme border of the tumour, as an oval tumour, or a tumour with irregular projections, may often be so turned and pressed out, as to pass without force through a much smaller opening than would at first sight be thought possible.

Adhesions are dealt with precisely as in ovariotomy. The chief difference observable in the vascularity is that, when the tumour is covered by the broad ligament, the veins are apt to be much larger. They should be avoided when possible, or, if opened, closed at once by pressure forceps.

When a long incision has been made, it is a good plan to pass 2 or 3 sutures near and above the umbilicus as soon as the tumour has been brought out, in order to prevent escape of intestine before proceeding to a separation of the tumour. The mode of separating the tumour will of course depend upon its connections. When there is a distinct pedicle, this may be secured exactly as in ovariotomy. When there is no pedicle, many plans of treatment are open to us, which will be described in one or other of the cases I am about to relate. The remarks upon the after treatment of cases of ovariotomy are equally applicable to those of myomotomy.

SOLID SUB-PERITONEAL UTERINE OUTGROWTHS, TREATED INTRA-PERITONEALLY

Solid tumour; no pedicle; ligature; death from hæmorrhage.—In the case of a single lady, 32 years of age, upon whom I operated in December 1874, removing a solid fibro-myoma which weighed 9 pounds, there was no pedicle, but the tumour appeared to be a prolongation of the fundus uteri towards the right, forming a circular neck about 2 inches in diameter. This was transfixed and tied in two halves. A third ligature was put on below the others. The tumour was cut away, and the uterus then appeared to be about the normal size. It was returned along with the ligatures, just as in ovariotomy. The patient died 40 hours after operation, of hæmorrhage. The ligatures were not sufficiently tight. I suppose that the uterine tissue had shrunk soon after the operation, the ligatures becoming loose. If the wound had been reopened and fresh ligatures applied, life might have been saved. The uterus, as well as the tumour removed, may be seen in the Museum of the College of Surgeons.

Solid sub-peritoneal outgrowth; second tumour not removed; recovery.—I do not think it has occurred to me more than twice to remove an outgrowth from the uterus, and then find that there were other growths which could not be removed, or which I thought it more prudent not to disturb. Occasionally a second growth has been removed, and in other cases there has been merely felt such slight enlargement, irregularity of surface, or

partial hardening as led me to believe that there might be some small interstitial fibroids. In the two cases I am about to mention, the growth not removed was nearly as large as that which was taken away. The first was in December, 1879, with Dr. Godson, who had recognised a fibroid outgrowth from the fundus as removable, and another from the cervix or body, which we explained to the patient would probably prove to be irremovable. At her desire I removed the mobile outgrowth, applying a clamp at the seat of connection between the fundus and the tumour, before cutting the tumour away. Wishing to treat the pedicle intra-peritoneally, I tied a ligature behind the clamp, but it cut quite through the uterine tissue, and the clamp came off. There was no bleeding, and I did not apply another ligature. The uterus was very irregular in form, with fibroid projections in different directions. Except some protrusion of omentum between two of the stitches, recovery was most satisfactory. The patient has remained remarkably well, without any further uterine enlargement.

Two fibroids, sub-peritoneal; one removed, the other left; peritoneum sewn over surface of stump.—The other case in which I removed a fibroid outgrowth from the fundus, about the size of a fœtal head, leaving undisturbed a considerable growth attached posteriorly and directed downwards into Douglas' pouch, was a single lady, a patient of Dr. Ord. In this case the treatment of the pedicle was also intra-peritoneal, the edges of the peritoneal coat of the uterus being closely brought together by uninterrupted suture over the surface where the tumour had been cut away. This patient also recovered well, and has not yet suffered from any enlargement of the growth which was not removed.

Solid fibro-myoma; ligatures; recovery.—In previous cases I had been content with the pressure-forceps described and figured in the 'British Medical Journal,' vol. i. 1879, p. 928; but, feeling the want of more effectual means of securing bleeding vessels before dividing them, I had forceps made similar in form, but with longer handles, and a compressing surface more than an inch in length. With several pairs of such forceps, applied before any tissues are cut through, large tumours may be cut away with only very small loss of blood. They were used with excellent effect in the following case.

On September 27, 1880, assisted by Mr. Thornton and Mr. A. Doran, I removed a large solid uterine fibro-myoma from a single lady, aged 41. By an incision 8 inches long, the tumour was exposed, or rather the omentum, containing very large veins, which covered the tumour and adhered to it. Two ligatures were applied to the omentum, which was then divided between them. Some adhesions to the abdominal wall were then separated, and the tumour turned out entire. It was a solid outgrowth from the left side of the fundus uteri. The band of connection between the uterus and the outgrowth was between 2 and 3 inches in length, and about 1 inch in breadth. This was first compressed and held by 2 of the large forceps just described, and the tumour was cut away. Then a large needle with double thread was pushed through the uterine tissue behind the forceps, and each thread was tied as the forceps were taken off. Lastly, the peritoneal edges of the divided uterine wall were brought together by an uninterrupted suture of fine carbolised silk. After the removal of the tumour, the rest of the uterus appeared to be quite normal in size and consistence. Both ovaries were healthy. Recovery went on without fever—the highest temperature was 100·2°. There was unusual nervous irritability during convalescence, perhaps explained by the facts that her father and an uncle had both been insane and attempted suicide; but she went away 30 days after operation in a very good state of health, and has since been quite well. Mr. Doran described the tumour as a solid uterine fibro-myoma, weighing between 7 and 8 pounds. This lady called on me in December 1884 in excellent health. The catamenia had been quite regular until October 1884. The size of the uterus was normal, and the only cause of complaint a protrusion of viscera behind the thin cicatrix in the abdominal wall.

SOLID FIBROIDS, SUB-PERITONEAL; TREATMENT EXTRA-PERITONEAL

Sub-peritoneal fibroid; clamp; recovery.—The patient was single, 37 years of age, and the operation was performed in April 1876. The tumour was a solid

fibroid outgrowth from the fundus uteri, and connected with it by a pedicle about 2 inches in length and 1½ inch in breadth and thickness. This pedicle was secured in a middle-sized clamp, which was kept outside without much pull upon the uterus, simply holding it up close to the abdominal wall. Both ovaries, Fallopian tubes, and the uterus appeared to be quite normal. The outgrowth which was removed seemed to be the only part diseased. The patient has been in good health ever since. The tumour was a solid fibro-myoma, which measured 25 inches in the longer and 13 inches in the shorter circumference, and is preserved in the Museum of the College of Surgeons.

Sub-peritoneal fibroid; pins and ligature acting as clamp; recovery.—In June 1871 I removed, in the Samaritan Hospital, from a married woman, aged 46, a solid outgrowth from the fundus uteri, which weighed 11 pounds 11 ounces, and was surrounded by 59 pints of serous fluid. The neck or connection between the tumour and the fundus uteri was first compressed by a large écraseur, but as this was tightened it cut through the uterine tissue, and free bleeding had to be stopped by twisted suture over long pins, which were afterwards fixed outside the wound like a clamp. On the 9th day these pins and ligatures came away; there was free bleeding. On tying the projecting stump the ligature cut through it, but the bleeding was stopped partly by perchloride of iron and partly by tying a vessel over a tenaculum, which did not come away till the 13th day. The patient perfectly recovered, and was in good health in the summer of 1884.

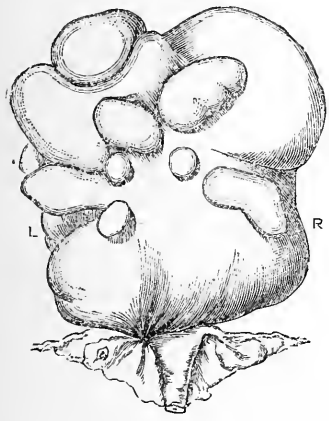
Two solid fibroids; clamp on one, ligature on the other; recovery.—I removed two solid fibroid outgrowths from the uterus of a single woman, 52 years of age, in the Samaritan Hospital, April 1877. One of these tumours had a pedicle, which was secured by a clamp; the other, which had no pedicle, was removed after transfixion and tying the connection with the uterus. Each of these growths weighed a little more than 4 pounds. One of them was partly calcified. A third outgrowth from the posterior part of the fundus, quite low down in Douglas's pouch, was not disturbed, as it was not larger than 2 walnuts and its connection was broad. The clamp was removed on the 9th day, with two thick silk ligatures and a slough through which they passed. On the 15th day some fetid pus escaped, when another slough, about 1½ inch long, was drawn out. The patient recovered rapidly, left the hospital within a month of the operation, and was well in July 1878.

Solid fibroid; pins and ligatures as clamp; death from embolic pneumonia.—In June 1870 I removed a solid myoma, weighing 22 pounds, from a single lady, 36 years of age, who died 14 days afterwards. The pedicle was treated extraperitoneally, 2 long pins and a ligature acting as a clamp. I had first used an écraseur, but the chain cut through the uterine tissue. Very free bleeding followed, which the actual cautery and ligatures failed to check. The patient went on very well for 14 days, and then she died of embolic pneumonia. It was most disappointing, for there was only a small superficial abscess in the abdominal wall, and no other reason to account for the condition of lung which caused death. I dressed the wound every day, and had not noticed anything indicating this collection of pus. But she became feverish, had symptoms of pyæmic pneumonia, and she died owing to this small abscess in the abdominal wall; for inside the peritoneum everything was absolutely healed. There was nothing about the uterus to attract attention. Its surface was quite smooth, the peritoneal edges of the incision perfectly united, and no traces whatever of any peritonitis.

Solid fibroid; forcipressure; no bleeding; no ligature.—In September 1879 I drew out, by tapping, about 30 pints of fluid from the peritoneal cavity of a widow, 52 years of age, and then found a solid uterine tumour as large as a fœtal head, which I removed on October 15, 1879, with 18 pints of ascitic fluid which had again accumulated. The tumour was an outgrowth from the fundus uteri, with a pedicle in circumference not much larger than half-a-crown, but only about ½ an inch in length. This was temporarily secured in a straight screw forceps and the tumour cut away. On opening the forceps no bleeding took place from the pedicle. The vessels had been so effectually crushed by the compression that a ligature was not needed. The tumour itself was about the size of two fists. It was not weighed. Both ovaries were normal and the uterus also, except

where the tumour had grown from the fundus. The patient recovered admirably well. It was remarkable that there was no re-formation of ascitic fluid, although before the operation 3 tappings had been necessary—one in March, 1879, of 5 gallons; a 2nd in April, of $3\frac{1}{2}$ gallons; and a 3rd 6 weeks later, of 5 gallons; and fluid to the amount of 25 to 30 ounces daily had been removed after the 3rd tapping by one of Southey's capillary tubes. The patient was reported to be wonderfully well in January 1885.

Solid fibroid from fundus; pin passed through stump and abdominal wall; death. —On April 7, 1869, I exhibited, at a meeting of the Obstetrical Society a fibroid outgrowth from the fundus uteri, weighing 34 pounds and 10 ounces, which I had removed a few hours before from a single woman, 36 years old. Eleven years before, half her lower jaw had been removed with a fibrous tumour by Mr.



Pemberton of Birmingham. An abdominal tumour was discovered in 1864; it enlarged gradually, and she was twice in the Birmingham Hospital. During the last 6 months the tumour had increased rapidly, and she became very weak and lost flesh. On admission to the Samaritan Hospital a very large abdominal tumour could be felt, but it evidently contained no cyst large enough to warrant tapping, and did not feel so hard as a fibroid tumour of the uterus. No vascular murmur was audible in it, and it appeared to move quite independently of a uterus of normal size. When the tumour was exposed I was surprised to find that it was not ovarian. It sprang from the posterior surface of the fundus uteri by a short pedicle, as shown in this drawing to scale by Dr. Junker, which represents the posterior surface of the uterus, with the Fallopian tubes and both ovaries. A ruptured Graafian vesicle is seen on the left ovary. The pedicle was secured by a clamp forceps and the tumour was cut away. Some bleeding spots where adhesions had been separated were secured by an acupressure needle, and the clamp was removed. Bleeding vessels were secured by hare-lip pins and twisted sutures, which also served to fix the bleeding surface to the abdominal wall by transfixion. The patient died on the 3rd day after the operation, not from any bleeding, peritonitis, or other direct consequence of the operation, but from fibrinous deposit in the right side of the heart. At the present day we should refer the cause of death in this patient to septicæmia, and believe that it might have been averted by antiseptics.

Dr. Braxton Hicks reported of the tumour that 'it was about 17 inches in diameter. It had a fluctuation very similar to that of an ovarian polycystic growth, which it also resembled much in appearance.

'The interior was found to be free from cysts, excepting a few of small size, of a false kind, formed by separation of the layers of the tissues, the largest not an inch in diameter, of irregular form. The tissue of which it was composed was arranged in a manner concentric with the true centre, except in the lobules, where it was arranged around the centres differing from the irregularly concentric arrangement generally found in mural uterine fibroid growths. When cut into, serum exuded rather freely. The inside of the growth was of a pink, semi-translucent colour.

'The microscopical examination of the growth showed it to be composed of areolar wavy tissue, interlacing in all directions, but the arrangement of the fibres was very open, and between them the serum was held; very little, if any, true uterine fibres existed.'

My present belief, founded on later experience, is that if the pedicle or connection with the fundus uteri had been treated either *intra*-peritoneally by ordinary or elastic ligature, or *extra*-peritoneally by a clamp, the result would have been better than by the combined method adopted of securing the stump to

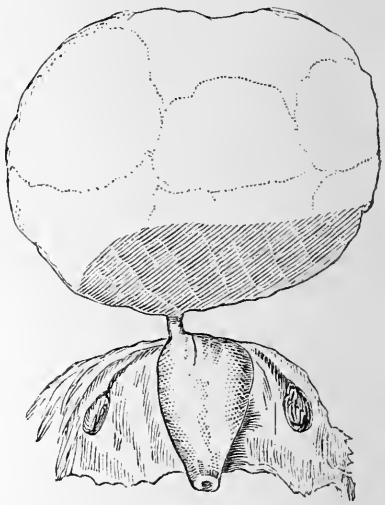
the abdominal wall by a pin which passed through both stump and wall.

FIBRO-CYSTIC UTERINE TUMOURS

Fibro-cystic outgrowth; ligature brought out of wound; death.—In the 3rd uterine case upon which I operated in 1863, there were very extensive parietal adhesions, which were, however, easily broken down. Some long bands of thickened omentum were also attached to the tumour, but the closest adhesion was to the right iliac fossa. On account of this close adhesion no proper pedicle could be defined. A thick band reached from the right side of the uterus to the tumour, which was embraced by a wide expansion of broad ligament that blended with the adhesions to the right iliac fossa. I transfixed below the Fallopian tube, tied and cut away the tumour. I then tied 3 large arteries in the fold of the broad ligament, and 2 on the surface of the stump. The left ovary could not be accurately defined. Two small fibroid outgrowths from the uterus were cut away; one of them was the size of a filbert, the other of 2 walnuts. They bled a little at first, but ceased on the vessels being compressed. The hæmorrhage during the operation, though rather free, was by no means alarming; perhaps 6 or 8 ounces of clot may have been taken from the abdominal cavity. I closed the wound with 6 deep and several superficial sutures, and brought out the ends of the ligatures at the inferior angle of the wound. The patient died in a few hours. Clot and serum were found in the pelvis. The uterus was about twice its natural size. The left ovary, slightly enlarged, retained its natural connection with the uterus. The tumour removed was a fibro-cystic outgrowth from the right side of the fundus of the uterus. The solid fibroid mass weighed 16 pounds 6 ounces, and the large cyst had held 26 pints of fluid and 4 pounds of lumpy masses of decomposed fibrine. The right ovary, slightly enlarged, adhered to the outer surface of the tumour.

FIBRO-CYSTIC OUTGROWTHS—INTRA-PERITONEAL TREATMENT

Fibro-cystic tumour; ligature; recovery.—I do not remember to have seen more than 1 case where a fibro-cystic tumour of the uterus had a very distinct pedicle. I removed such a tumour in December 1884 from a single lady, 30 years of age, a patient of Mr. Aikin. The tumour was a fibroid outgrowth from the fundus, with a pedicle about the length and size of a small finger. Near the pedicle the tumour was quite solid. In the upper



portion were several cystlike cavities, which contained clear reddish fluid. These were tapped, their thin membranous coats, which adhered to the inner surface of the abdominal wall, were separated, and drawn out with the base of the tumour and the pedicle. This was transfixed and tied in 2 portions with silk ligatures, which were cut off and returned after dividing the pedicle. The uterus then appeared to be of normal size, and both ovaries were normal. The patient recovered without fever, sickness, or pain, and the only dressing was a week after the operation, when the stitches were removed.

Fibro-cystic uterine tumour; ligatures; recovery.—In October 1879 I treated a much larger fibro-cystic tumour in the same way, although there was not nearly so distinct a pedicle. The solid portion of this tumour weighed 5 pounds, and the cystlike cavities contained 21 pints of fluid and a great deal of old blood-clot. The patient was a Dutch lady, 40 years of age. There were extensive adhesions to the abdominal wall, to omentum, and to several coils of small intestine. The connecting medium between the fundus uteri and the tumour was first com-

pressed by 3 pairs of large forceps. After cutting away the tumour, the stump was transfixed and tied in two parts, as the forceps were removed. A 3rd ligature was afterwards tied round the other 2. The ends were all cut off close to the knots and returned with the uterus, which was irregularly enlarged to 2 or 3 times its normal size. Both ovaries were normal. The patient recovered without one bad symptom, and returned to Holland 24 days after operation. I heard of her in August 1884 as quite well.

FIBRO-CYSTIC TUMOURS, TREATED EXTRA-PERITONEALLY

Fibro-cystic tumour of uterus; clamp; recovery.—In the case of a German lady, single, 40 years old, from whom I removed in May 1875 a fibro-cystic uterine tumour, $7\frac{1}{2}$ pounds solid with $11\frac{1}{2}$ fluid, there was a sort of pedicle, or prolongation, from the left side of the fundus uteri, about 3 inches broad and $\frac{3}{4}$ of an inch thick. This was secured in a large clamp. The patient perfectly recovered, and is still in good health. But the most curious point in the case was, that about 6 hours after the operation she appeared to be almost dead, as if from internal bleeding. On removing one of the stitches, nothing but red serum escaped. This continued to flow in such quantity that a large drainage-tube was introduced, through which the discharge continued to be very free for 3 days. The tube was then removed, but discharge went on until the clamp was found loose in the dressings on the 10th day. After this there was gradual improvement.

Fibro-cystic tumour; clamp; recovery.—On July 24, 1878, Mr. Cowan of Bath wrote to ask me to see a lady who, by his desire and that of Dr. Swayne of Clifton, was leaving for London that day, in order to consult me. The next day I saw this lady, 39 years of age, suffering considerable abdominal pain and difficulty of breathing after her journey. She had been married 4 years, and had not been pregnant. The catamenia were regular, and a period was due. She was suffering so much that I did not make a complete examination; and the next day the suffering was so great that I tapped a large cyst, felt between the umbilicus and the sternum, and removed 19 pints of dark fluid, with which (as the cyst became empty) a little blood was mixed. A large semi-solid tumour, reaching a little above the umbilical level, was then felt, and a harder portion was found in the right iliac fossa, which, by combined external and internal examination and the use of the sound, was ascertained to be the uterus, high up and to the right, closely connected with the lower portion of the tumour, but apparently separable the one from the other.

Mr. Cowan informed me that the illness commenced in the summer of 1876, in Italy, whither the patient had gone to recruit after great mental strain. The first symptoms were dull pain in the left iliac region, with a sense of fulness, pain on pressure, and constipation, followed by a steady increase in size till February 1877, when he (Mr. Cowan) found 'fluctuation in the left iliac region, and a solid tumour passing down into the pelvis anterior to the uterus.' There was steady but slow increase until October 1877, when sudden painful swelling of the left leg set in, with acute pain in the left groin. After a fortnight this subsided, but the cyst increased more rapidly, and a solid mass was found to the right of the median line in the umbilical region. Dyspnœa and general distress increased, and walking became difficult.

My diagnosis was a multilocular ovarian cyst, displacing the uterus upwards and to the right. This was confirmed by an examination of the fluid removed by tapping, by Mr. Thornton, who reported it as 'not differing in any way from ordinary ovarian fluid, except the blood, which is fresh, and probably from some accidental wound of a vessel. Now the blood has settled, it looks like the ordinary "linseed-tea" fluid, and the tests and microscope confirm its ovarian characters.'

Great relief followed the tapping. The catamenia came on and ceased on August 1. But the fluid began to collect again, and some interference with respiration became an increasing trouble. Dr. Day examined the chest on August 10, and found some dulness on the lower part of the left lung, which he attributed to pressure. We therefore decided on removal of the tumour.

I performed the operation on August 12, under spray and with strict antiseptic precautions, assisted by Dr. Bantock, Dr. Woodham Webb, and Mr. Cowan of Bath,

Dr. Day administering methylene. By an incision 5 inches long, in the median line between the umbilicus and symphysis pubis, a very thin cyst was exposed. It was bluish in appearance, like the peritoneum. On tapping it, reddish serum escaped. Extensive adhesions to the abdominal wall above, and to the intestines behind and to the left, were separated, and the empty cyst was drawn out with a mass of solid substance at its base. I then found that both ovaries were healthy; that the uterus was about twice the normal size, irregularly nodulated and hardened; and the tumour was an outgrowth from the back part of the fundus. The connecting medium or pedicle was fully an inch in length, and about 2 inches in breadth and 1 in thickness. I secured this in a large clamp and divided the attachment. Then I had to dissect off the back part of the tumour from the sigmoid flexure of the colon and from the rectum, with scissors. In doing this, I accidentally made an opening into the upper part of the rectum, about an inch long, but sewed it up immediately with an uninterrupted suture, carefully sponged out the peritoneal and pelvic cavities, secured several bleeding vessels in parts where adhesions had been separated, and closed the wound by silk sutures around the clamp, which lay at the lower angle of the closed wound.

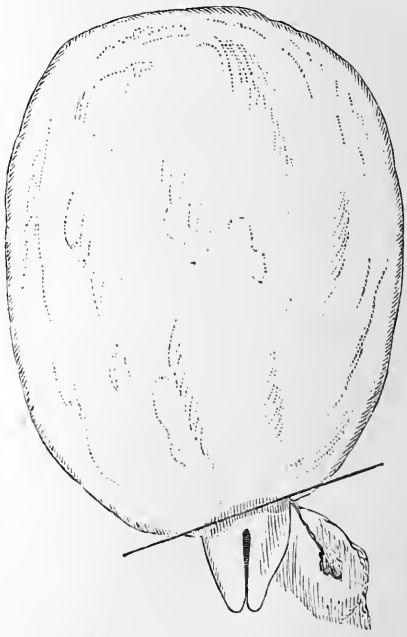
Dr. Woodham Webb examined the tumour, and reported as follows: 'Weight of solid, $2\frac{1}{4}$ pounds; fluid contents, 14 pints. The tumour was an outgrowth from the upper and back part of the uterus, about 7 inches long, 4 broad at its widest part, and at one point 2 inches thick. It was of a flattened lozenge shape, and consisted of uterine tissue very slightly changed in appearance. It was surrounded by 3 large cysts, which had developed on its surface, 2 of about equal size and 1 not more than half that of the others—the 3 having contained 14 pints of a red serous fluid. The walls of the 3 cysts were thin, with a fine layer of muscular tissue, spread out in irregular bundles between the 2 serous membranes—the peritoneum and the cyst lining. Inside the cysts, on the solid mass, were several ecchymosed spots, the lining membrane being detached and giving rise to small secondary cysts. There were a few nodules of fibrous tissue in various parts of the cyst-walls.'

The progress after operation was one of uninterrupted recovery. The highest temperature was 100·2°; the most rapid pulse, 108. The clamp came off on the eighth day. The wound above the clamp healed by first intention. Thymol gauze was the only dressing used.

Writing to me, December 5, 1878, the patient says: 'I am wonderfully well, and am getting back my walking powers. I have not felt so well nor in such spirits for years past.' She was still quite well in the summer of 1884.

SUPRA-VAGINAL AMPUTATION OF UTERUS WITHOUT OPENING THE CAVITY

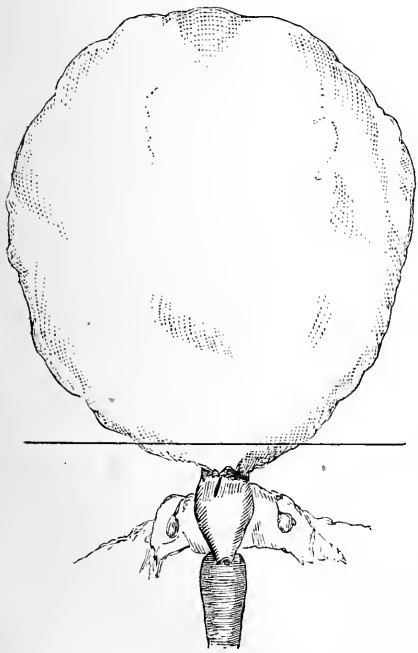
Amputation; cavity not opened; intra-peritoneal ligature; recovery.—In a case where the tumour was removed without opening the uterine cavity, the bleeding was arrested temporarily by pressure-forceps. Ligatures were afterwards tied upon all bleeding vessels as the forceps were re-



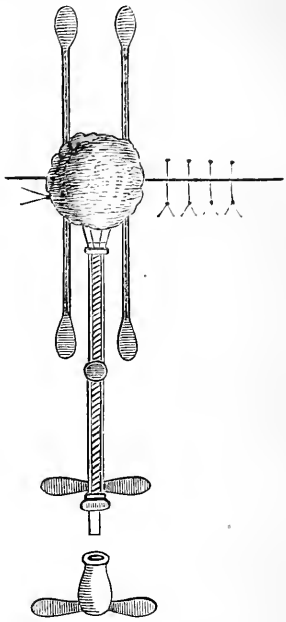
moved, and I took away a solid fibrous tumour, which, after about 3 pints of blood had drained from it, measured 29 inches in the longest, and 24 in the shortest, circumference. I performed the operation in August, 1879, at Kidderminster, assisted by Mr. Stretton. The right ovary, which had adhered to the outer surface of the tumour, was cut away. The uterus left was very small, and its cavity was not

opened. The tumour was a solid mass of dense white fibrous tissue, and after the greater part of it had been cut away its base was shelled out from a layer of uterine tissue about a third of an inch in thickness, showing that the fundus had been expanded over an intra-mural fibroid. This patient recovered with as little illness as after an ordinary ovariotomy, and has remained well.

Amputation; cavity not opened; extra-peritoneal compression; recovery.—I obtained an equally successful result after removing a solid fibroma, weighing 30 pounds, nearly circular, measuring 40 inches in the longest and 38 in the shortest circumference, but by extra-peritoneal treatment. I operated in November 1884, assisted by Mr. Meredith and Mr. Jennings. The incision measured 11 inches. Extensive parietal adhesions were separated; two pieces of adherent omentum and one of small intestine were also sepa-



rated. A broad attachment of the fundus uteri was first surrounded by an elastic ligature. The tumour was then cut through about 2 inches beyond the ligature, and after the abdominal wall had been nearly closed by sutures, the base of the growth was shelled out from the uterine wall. Doubting whether extra, or intra, peritoneal treatment of the stump would be preferable in this case, I removed the elastic ligature. Such very free bleeding came on from the whole of the surface from which the growth had been shelled out, that I put on a wire compressor, and fixed the stump in the lower angle of the wound. I also fixed



the peritoneal coat of the uterus, close to the compressing wire, to the peritoneal coat of the abdominal wall on each side of the incision. The uterus as left was rather large and irregular in outline. The ovaries and Fallopian tubes were not touched. Daily tightening of the wire compressor, paring away portions of the stump, and applying perchloride of iron, made a very tedious contrast with cases treated intra-peritoneally; and it was not until the 28th day that the wire could be removed. I saw this patient in March 1885. She was quite well.

Amputation; cavity not opened; intra-peritoneal ligature; recovery.—The next case is one of almost unexpected, but complete, recovery. In May 1876 a married lady, aged 38, called on me with a letter from Dr. Birch, of Hazaribagh, in India, under whose care she had been since May 1875. She was married in 1871, went to India in the same year, had never been pregnant, but remained in good health until she suffered from fever in September 1874. In February

1875, Dr. Ewart, of Calcutta, discovered an abdominal swelling which he thought might possibly be early pregnancy, although there had been no irregularity in menstruation. The swelling increased rapidly in 1875, and when I saw her in May 1876 the uterus was evidently enlarged to the size in the fifth or sixth month of pregnancy. As there were no urgent symptoms, she returned to India, and I did not see her again until May 1877. There had been some slight increase in the size of the uterus, and menstruation was becoming rather profuse; but she remained in fairly good health till July 1878, when her general health suffered after much anxiety and over-exertion; but she got over this, and went through 1879 pretty well. In June 1880, the tumour having considerably increased in size, Sir W. Jenner saw her with me in consultation as to the question of operation, and it was decided that there should be further delay, but that the tumour should be removed as soon as it became intolerable. Menstruation became still more profuse, size increased, she lost flesh, became unable to take any but very short walks, the feet swelled, and purpuric spots appeared on the legs. In December 1880, at another consultation with Sir W. Jenner, we found a large solid tumour, reaching quite up to the ensiform cartilage, and an ovary could be felt and moved in each iliac region. The uterine cavity was slightly elongated, but I thought the tumour and part of the fundus uteri might probably be removed without opening this cavity. It was agreed that I should attempt to remove the tumour; but that, if the difficulty proved to be greater than I expected, I should then remove both ovaries in the hope of thus leading to atrophic change in the tumour. We waited until after the cessation of another menstrual period, and I then went into Gloucestershire, and operated on February 12, 1881. After making an incision from 2 inches above to 6 inches below the umbilicus in the median line, the enlarged solid uterus was exposed, free from adhesions, but covered by very large veins, and there was no distinct neck to the tumour or fundus. The left ovary was large, and both were easily separable from the tumour. My first intention, accordingly, was to be satisfied with removal of both ovaries, and leave the uterus alone. On drawing up the left ovary, a cyst, or corpus rubrum, in it burst, and much black clot was pressed out. I then transfixed, tied the connecting tissues between the ovary and the enlarged uterus, and cut the ovary away. Very free bleeding followed, and successive ligatures cut through a soft venous plexus. I therefore felt compelled to remove the tumour, and, after applying on each side, before and behind, 4 pairs of large pressure-forceps, I amputated the tumour, cutting through the fundus uteri diagonally from the right Fallopian tube, downwards and to the left of the bleeding surface, where the left ovary had been attached. The uterine cavity was not opened. Part of the fundus and the body left with the cervix were normal in size and consistence. The left Fallopian tube was removed with the tumour. The right remained; and the right ovary, although rather large, was not disturbed. Theoretically, it might have been better to remove it; but I was very unwilling to prolong a serious operation by anything not absolutely necessary. Several very large arteries and veins were secured, some by ordinary ligature of carbolised silk, some by ligature after transfixing the uterine tissue; and then the peritoneal edges of the divided fundus were brought together by suture. Although a great deal of blood was lost, the lips never lost their colour, and there was no vomiting. The patient was exactly an hour under the influence of the anæsthetic, and Dr. Day told me that he had never given so much methylene before at any of my operations. Nearly two ounces were used. I did not make any provision for drainage, as I had carefully sponged away all blood and clot; and the wound was united in the usual way by silk sutures. Phenolised spray was used, phenolised sponges, ligatures, and instruments, and dry dressing. The tumour was a solid fibroma, with several projections or outgrowths from the peritoneal surface. It weighed 11½ lbs.

The patient was left in charge of Dr. Forty, of Wotton-under-Edge, and recovery was not interrupted by any bad symptom. The temperature reached 101°, and the pulse 104, on the third day; but the convalescence may be said to have been without fever. I saw the lady in London on April 28th, quite well, and with nothing but the linear cicatrix in the abdominal wall to be detected as showing

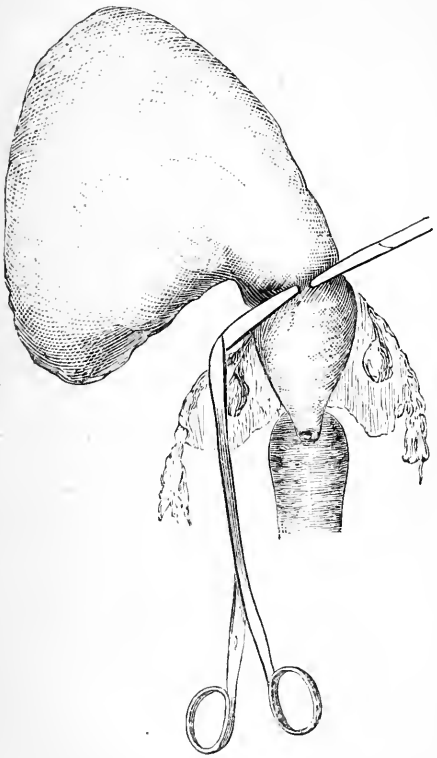
that there had ever been any disease of the uterus. The cervix was mobile, and nothing abnormal could be discovered anywhere. The catamenia appeared as usual the first week in May, after an interval of three months, and passed off normally. The lady called on me in London in September 1884, having continued in excellent health, menstruating regularly until the end of 1883.

Amputation; cavity not opened; intra-peritoneal treatment; recovery.—In the following case, operated on June 27, 1881, the operation might have been described in exactly the same terms, except that the left ovary was left with the remnant of the uterus in this case, while the right ovary was left untouched in the preceding case. Both may be described as supra-vaginal amputation of the uterus with removal of one ovary. The lady was a widow, 52 years of age, but still menstruating regularly and profusely, mother of 4 children, the youngest of whom was 26 years old. She was sent to me by Dr. Kidd on account of severe flooding at every monthly period, which went on to faintness, and was followed by extreme exhaustion. Sir W. Jenner saw her with me; and, on the risk of the operation for the removal of the large uterine tumour being explained to her, she decided to wait. She went to Switzerland, and almost died at Berne from very alarming hæmorrhage. As soon as she was able to travel she returned to England, determined to submit to the operation which I have already alluded to. The recovery was uninterrupted except by a very troublesome irritation of the bladder. She was obliged to travel to Davos-Platz in October 1881 with an invalid relative, and although she suffered at first from living at such an elevation, she wrote to me on December 15, 1881, saying, ' The pain in the bladder scarcely gives me any trouble, and I have seen nothing at the monthly periods. Indeed, the only inconvenience arising from the operation is the necessity for wearing a belt ' in consequence of the threatening of a ventral hernia at a weak part of the cicatrix in the abdominal wall. This annoyed her so much that in the summer of 1882 I removed the bulging part of the cicatrix, which was very thin, thus opening the peritoneum for about 2 inches, and brought the edges of the opening together by several sutures. No bad symptom followed, but firm union. No truss was afterwards necessary, and I saw this lady in November, 1884, in excellent health.

Amputation; cavity not opened; death.—In one other case of removal from a married lady 35 years of age, of a large solid uterine fibroma, weighing between 15 and 16 pounds, and which had been surrounded by ascitic fluid, I have to record an almost sudden death from shock and hæmorrhage. The patient died a few minutes after being placed in bed. No very great amount of blood was lost, but the patient took methylene very badly, and I think she was injuriously affected by the cooling influence of the spray.

Solid outgrowth from fundus; cavity not opened; intra-peritoneal treatment; recovery.—Among the solid tumours removed, not on account of their size, but because of the extreme suffering they caused, I may mention the case of a married lady 40 years of age, from whom I removed, in July 1882, a solid outgrowth from the fundus which weighed only a pound and a quarter. She was married when only 22 years of age, and had never been pregnant. The catamenia had been quite regular, but very abundant, and lasting about 7 days. She had suffered for many years from excessive pain in the right side of the abdomen and right loin, which had been attributed to pressure on the right kidney or ureter, so that for many months she had been obliged to take on an average 150 minims of Squire's Solution of Bimeconate of Morphia daily. In the intervals between the menstrual periods there was a constant discharge of offensive viscid greenish secretion, accompanied by great depression of spirits. No tumour could be felt by the vagina, but a solid tumour was felt in the right iliac region and in the loin, all movements of which immediately caused corresponding movements in the cervix uteri. The uterine cavity was not elongated. After exposing this tumour as in ovariotomy, I found that it was an outgrowth from the fundus uteri towards the right side above the Fallopian tube. Temporarily compressing the neck by two pairs of large forceps, as shown in the woodcut, the tumour was cut away about half an inch above the forceps. Transfixing between the points of the two forceps with a large needle carrying a double strong silk ligature, each ligature was tightened below the forceps, and as

the forceps were successively removed the ligatures were still further tightened before the second knot was made. A third ligature was then applied close behind the other two. The peritoneal edges of the stump were then brought together by a few points of uninterrupted suture of fine silk. The uterus, Fallopian tubes and ovaries appeared then, with the exception of the sutured spot, to be quite normal. Recovery was uninterrupted at first. The sutures were removed on the 7th day, and the wound appeared to be firmly united, but on the following day she made some straining effort during defeca-



tion, the wound partly reopened, and there was a considerable escape of intestines. I replaced them within an hour of the accident, inserted fresh sutures, and recovery hardly seemed to be delayed. All the old symptoms disappeared, and the health greatly improved. The catamenia appeared regularly, but there has been frequent suffering from a troublesome neuralgic affection of the bladder. Neither has Sir Henry Thompson, who carefully examined her, nor have I been able to discover any cause for this condition. It was greatly relieved this summer by a visit to Ems, and though still coming on frequently after passing water, she has been able entirely to give up the use of morphia.

Fibroma of fundus; cavity not opened; extra-peritoneal treatment; death 18th day.—On February 2, 1885, assisted by Mr. Hough and Mr. Green, of Derby, chloro-methyl being administered by Dr. Lathbury, of Breaston, I removed from a single lady, 43 years of age, a myo-fibroma containing a cystlike cavity at the upper part, which had caused great suffering for many years, much increased latterly. There was no pedicle. The tumour was a prolongation of the fundus uteri above the right Fallopian tube. Two pins were passed, as shown on page 153, but instead of the wire and compressor, an indiarubber ligature was tied behind the pins, and the stump and peritoneal coat of the abdominal wall were fastened together by sutures. The patient went on remarkably well for several days under Dr. Lathbury's care, but on the day after the sutures were removed the wound partly reopened and intestines escaped. Dr. Lathbury reapplied the sutures, and the accident did not appear to have done much harm; but death occurred on the 18th day. The stump had separated three or four days previously.

SUPRA-VAGINAL AMPUTATION OF UTERUS; CAVITY OPENED

Solid abdominal tumour; part of uterus and both ovaries removed; cavity opened; long ligatures; death 4 days afterwards.—On September 9, 1861, I was consulted by a married lady from Liverpool, respecting an abdominal tumour which gave her the appearance of being quite at the end of pregnancy. It appeared to be solid. The girth at the umbilicus was 41 inches, the measurement from pubes to umbilicus was 10 inches, and from umbilicus to sternum 9 inches. The tumour moved freely beneath the abdominal wall. Professor Pirrie, of Aberdeen, called on me during the first visit of this patient, and saw her with me. She told us she was 33 years old, had been married 14 years, but had never been pregnant, and had never menstruated before her marriage, nor until 10 years after it. Yet for the last 4 years she had been tolerably regular, the quantity and character of the discharge being normal. For about a

week before each period, she was accustomed to suffer pain in the back, which lasted during the flow, but after it ceased she was always decidedly better for two or three weeks. She remarked that she was larger about the time menstruation commenced, but attention was not called to the abdomen for another year. Then she began to lose flesh and colour, and Dr. Battie, of Liverpool, saw her. For 12 or 18 months increase was slow. In January 1861, she became seriously ill, and in May went to Dr. Clay, of Manchester, who told her that she had ovarian disease in an advanced stage, but advised delay on account of the solidity of the tumour. I also thought the tumour was ovarian, but its extreme solidity led me to explain to the patient that a large incision would be necessary for its removal, and that therefore the operation would be additionally hazardous. Professor Pirrie concurred with this opinion. She returned to Liverpool, but suffered so much that she returned to town in October determined to have the tumour removed. I then became more doubtful as to its nature, but even more convinced than before from its mobility that it could be taken away, and I operated on October 14, 1861. Mr. Cooke, of Charlwood Street, gave chloroform, and I was assisted by Mr. Henry Smith and Dr. Rogers. By an incision 10 inches long, from 2 inches above the umbilicus, a solid non-adherent tumour was exposed and turned out without difficulty. It proved to be a fibroid outgrowth from the fundus of the uterus, and I passed the chain of an écraseur around a sort of stem just where the body of the uterus becomes continuous with the cervix. As the chain was tightened, the shaft of the instrument bent, and it became useless. I therefore substituted for it a very large clamp, and cut the tumour away. Some oozing of blood from the cut surface of the stump led to a further tightening of the clamp, when the instrument broke, and we had copious hæmorrhage from very large vessels. But they were all tied, and the wound was closed by pins and sutures, the ligatures being brought out at the lower angle.

The tumour was quite solid, and weighed 27 pounds. It consisted of the fundus uteri greatly enlarged, with both Fallopian tubes, and with both ovaries, about twice the natural size, adhering one on each side of the uterus, and containing clots. The growth of the fundus, while the cervix remained of the natural size, had led to a sharp line of demarcation, or deep sulcus, in the body of the uterus. It was here that the separation had been effected, so that the os and cervix felt perfectly normal after the operation.

The patient rallied tolerably well after the operation, and became fairly comfortable in the afternoon after 2 opiate enemas, and passed a pretty good night.

On the first day after operation she was pretty well all day; warm and perspiring; the pulse from 110 to 120; some tympanites, but no vomiting, and having a natural quantity of urine removed by catheter. Towards evening the pulse became feebler, and there was some dyspnœa with somnolence, although no opium had been given since the morning. Beef-tea was injected into the rectum. On the second day she was said to have had a good night, sleeping a good deal, but the pulse was 130, and occasionally intermitted. She had also vomited 2 or 3 times during the night. Her aspect was good, the skin comfortably warm, and she had no pain, but complained of great weakness. In this state she continued, most assiduously supported by Mr. Cooke, but continuing to get weaker and weaker, until she died 4 days after the operation. No post-mortem examination was permitted.

Amputation; cavity opened; death 6 months after.—In one case I removed the fundus and body of the uterus, enlarged to the size of an adult's head, by what we believed at the time to be an innocent myoma. The patient recovered well from the operation, but died 6 months afterwards of cancer of the cervix. The operation was performed in May 1869.

Amputation; clamp and ligature; recovery.—The next case was treated extraperitoneally by the clamp. I operated at the Samaritan Hospital in April 1874. Dr. Keith, of Edinburgh, and Dr. Madelung, of Bonn, were present. The patient had been married 7 years, was 33 years of age, but had never been pregnant. The operation was begun as an ordinary ovariotomy. A solid tumour was covered by omentum, the veins of which were very large. On pushing this aside the peritoneum was seen to be studded all over with small hard bodies like mustard seeds. After separating, tying, and

dividing the shreds of omentum, the tumour was brought out entire. Its base or neck was secured in the largest size clamp, which was fixed outside. On cutting away the tumour just above the clamp, I found that I had cut through the uterine cavity, which was in the centre of the fibroid mass. The right ovary was just below the clamp. This, with the tube, was secured by a double ligature, which was tied to the arc of the clamp. Part of the stump which projected above the clamp was then cut away, and was found to include the uterine cavity quite down to the neck, so that the clamp must have compressed part of the cervix uteri. The tumour was a fibromyoma which weighed 11½ pounds. The clamp did not come off till the 15th day, and part of the double ligature not till the 30th day after the operation. The patient went home well in 6 weeks, and Mr. Soper, of Dartmouth, wrote to me in July 1878 that she had enjoyed good health since the operation.

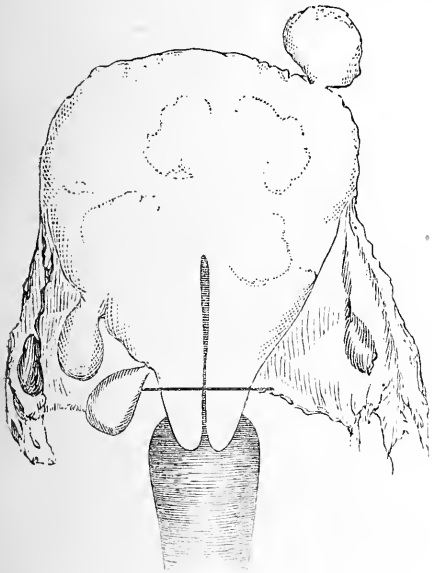
Amputation; cavity opened; death.—In one case which I operated on in July 1877, removing a uterine fibroid, weighing 12 pounds, and both ovaries, the uterine cavity being in the middle of the tumour the treatment was extra-peritoneal, a long needle with an écraseur chain behind it acting as a clamp. The patient died on the 3rd day, of septicæmia.

Between 1878 and 1880 I adopted 2 important modifications in the operative procedure—first, the more complete use of antiseptic precautions; and, secondly, the union by suture of the peritoneal edges of the divided uterine wall. I also contrived better pressure-forceps for securing divided blood-vessels before tying. In a paper read at the Cambridge meeting of the British Medical Association, in August 1880, and published in the Journal of the Association, September 4, 1880, I said, 'Whatever doubt some may entertain as to the value of my experiments on animals, and practice on women, in leading most operators in the present day to bring divided edges of peritoneum together whenever they have been separated by wound or by operation, I myself have no doubt whatever about it; and just as strongly as I assert that it is, and must be, better when the abdominal wall is divided to bring the peritoneal edges and surfaces of the opening together, restoring the complete closure of the peritoneal cavity, than to leave the cavity free to the admission of fluids oozing from wounded muscle, fat, and cellular tissue, and to allow contact of intestine and omentum with anything more than peritoneum; so strongly—more strongly if I could—would I insist that the peritoneal edges of the divided uterine wall, or of the connecting part of the outgrowth with the uterine wall, should also be carefully brought together . . . by many sutures, or by uninterrupted suture along the whole extent of the gap.' In concluding that paper I alluded to a case then under observation, which I brought forward partly to illustrate the advantage of completely uniting by suture the divided edges of the peritoneal wall, and partly to argue that, when the uterine cavity has been opened, it is better not to close the mucous surfaces also by sutures, after the method of Schröder, as the opening left for some oozing of blood through the vagina may sometimes be useful. A few more details of this case may be now given.

Amputation; cavity opened; peritoneum sewn over stump; recovery.—On June 9, 1880, I saw a married lady, aged 62, in consultation with Dr. Richard Smith, of Haverstock Hill, who had been called in about a fortnight before, on account of uterine hæmorrhage. This, after 12 years' absence, had come on at the end of 1879, and had recurred since every 3 weeks, lasting 1 week. She had consulted an obstetric physician 4 years before, who said that there was 'ovarian enlargement.' She had been married twice, had 1 child by her first husband 29 years ago, and had never been pregnant since. With the return of the uterine hæmorrhage there occurred enlargement of the abdomen, which increased rapidly, loss of flesh, shortness of breath, and very obstinate constipation. The girth of the abdomen at the most prominent part was 42 inches. The uterine cavity only measured 2¾ inches, but the cervix moved in all directions with a large semi-solid tumour, which filled the whole abdomen quite up to the ensiform cartilage. I removed the tumour on July 21, 1880, cutting away nearly all the supra-vaginal portion of the uterus, and after tying all bleeding vessels, carefully sewing together the peritoneal edges of the divided uterine wall. For about 3 days afterwards a little bleeding went on through the vagina, but the patient recovered without any febrile ele-

vation of temperature, was in excellent health in 1881, and so remains. The doubt as to the tumour being ovarian was accounted for by the fact that a large cyst-like cavity in the centre of the tumour contained 13 pints of bloody fluid, while the solid portion weighed only a little more than 2 pounds. I am much indebted to Dr. R. Smith for his assistance at this operation, and for his care of the patient afterwards, as she remained in his charge during my absence from London.

Supra-vaginal amputation; peritoneum sewn over cut surface; death on 9th day.—The relative value of extra-peritoneal and intra-peritoneal treatment of the pedicle of uterine tumours, or of the divided



surface from which the tumour has been cut away, or of the body of the uterus itself in cases of supra-vaginal amputation of the enlarged uterus, with or without one or both ovaries, cannot yet be estimated with anything approaching to certainty. Cases, both fatal and successful, may be adduced in favour of both methods, and of different modes of carrying out the details of each method. In one case, where I removed the whole of the supra-vaginal portion of an enlarged uterus with fibroid outgrowths, both Fallopian tubes and ovaries, in July 1873, Dr. Martin Sims and his son being present, I secured by forceps all the bleeding vessels as they were divided in cutting away the uterus. The vessels were afterwards tied as the forceps were removed. The uterine cavity had been cut through about the level of the os internum, but the peritoneal surfaces were so sewn together by uninterrupted silk suture as to perfectly shut off communication between the peritoneal cavity and the vagina. The patient died on the 9th day, of septicæmia.

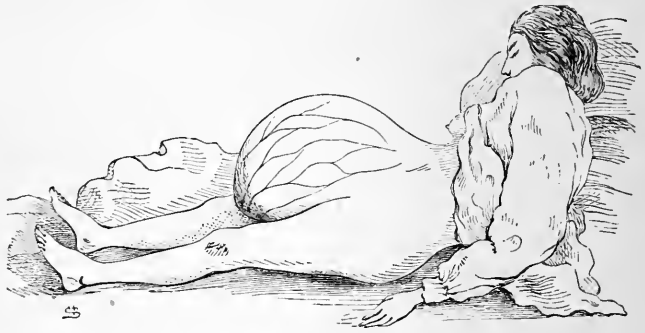
Supra-vaginal amputation of the uterus with 2 tumours; extra-peritoneal treatment; recovery.—In March 1884 I operated upon a lady 34 years of age, who had been married 2 years, but had not been pregnant. She was in extreme suffering from 2 solid tumours, 1 of which was freely movable in the abdomen, extended over the left side up to the left false ribs,

and could be felt in the pelvis between the uterus and the bladder. The other, much smaller, was low down in Douglas's pouch, considerably encroaching upon the rectum. The larger tumour to the left I found was formed by the fundus uteri irregularly enlarged. The smaller tumour behind and to the right was an outgrowth. Both were drawn out together; a wire was passed round the uterus, just below the outgrowth but above the bladder, and tightened by a screw. Two long pins were pushed through the neck of the tumour above the wire, and the tumours were cut away. The incision went through the uterine cavity, near the

internal os. I did not disturb the ovaries. In uniting the incision in the abdominal wall, the lower suture was passed through the peritoneal coat of the uterus, close to the constricting wire. The mass removed weighed 5 pounds 7 ounces. The patient recovered, but it was more than a fortnight before the pins and wire came away, and whenever the wire was tightened she complained of extreme pain. Before the cicatrisation of the wound was complete, a uterine sound could be easily passed from the lower angle of the unclosed wound through the os uteri into the vagina. I saw this lady in September 1884, well and strong, not having had any return of menstruation or periodical trouble of any kind, although neither of her ovaries had been interfered with, and there was nothing in the condition of the cervix uteri, nor anything which could be felt by vaginal examination, which would have led anyone ignorant of what had been done to suppose that the pelvic organs were otherwise than perfectly normal.

ENUCLEATION

Retro-peritoneal tumour; enucleated; recovery.—A remarkable case was that of a lady whom I saw in consultation with Mr. Symonds, of Oxford, in February 1878. She was single and 36 years of age. Her abdomen was enormously enlarged by a solid tumour, which extended upward behind the lower ribs on both sides, pressing them outwards, and passed down-



wards into the pelvis, filling up the hollow of the sacrum and causing prolapsus of the posterior wall of the vagina. There was considerable œdema of the feet and legs, which was said to disappear for a time after the cessation of each monthly period. The cervix uteri could not be reached, and it was impossible to ascertain where the uterus was situated. The catamenia were regular in time and normal in quantity. Mr. Symonds had advised removal of the tumour in 1876 when it was much smaller, but the patient and her friends steadily objected. The first symptom of illness was in 1868, when backache became troublesome, and soon after a small tumour was discovered in the left side of the abdomen. The growth went on slowly for some years, but in 1877 was much more rapid. When the patient came under our observation in February 1877, I expressed my opinion to Mr. Symonds that, as the tumour was quite solid, not fluctuating, and as the uterus could not be found, an accurate diagnosis was impossible, and that only an exploratory incision could determine as to the possibility of removal. I thought the tumour more likely to be uterine than ovarian, and probably some such rare form of abdominal fibroma as I had once removed in Germany, and which has been described by Virchow as *fibroma molluscum*, not necessarily connected with either uterus or ovaries. The decision as to operation being left to the patient, she at first declined, but suffering became daily greater, and it was arranged that I should make an exploratory incision on March 7, four days after the cessation of the catamenia.

The sketch above, although made of another patient, gives an excellent idea of the appearance of this lady at the time, except that it hardly shows how much the tumour encroached on the thorax, and not at all the œdema of the legs.

Mr. Symonds and Mr. Hill being present, an incision was made in the median line between the umbilicus and pubes, and I cut into the substance of a solid tumour which was closely adherent to the

abdominal wall. After separating some adhesions, I passed my hand into the peritoneal cavity and found the tumour to be free from adhesions on the left side, also behind and above, but to be closely bound down on the right side. In front, the bladder was so high that the incision could not be carried within about 4 to 5 inches of the pubes. So it was extended upwards, about 5 or 6 inches above the umbilicus, as soon as I had convinced myself that it would be possible to remove the tumour. A large piece of adhering omentum was detached from the upper part and behind. Towards the left side a broad mesenteric attachment was divided by the knife, large vessels being temporarily secured by torsion-forceps. I was then able to shell out the tumour from a sort of vascular capsule, formed by two layers of the right broad ligament, and separate it, but only by the knife, from the posterior surface of a uterus of normal size, after forcibly pulling the tumour up out of the pelvis and separating it from the rectum, to which it adhered closely. The right ovary (although normal) was cut away because the Fallopian tube had been divided and the broad ligament was much torn. The left ovary and Fallopian tube were not disturbed. Several silk ligatures were applied to the right of the uterus, and also to open vessels on its posterior surface where the tumour had been cut away. Two large pieces of omentum were cut off after securing them by ligature. I then found that the two opposite sides of the remnant of the capsule of the broad ligament (out of which I had enucleated the tumour) could be brought together behind the uterus, so as to complete the union of the divided peritoneum from the lower angle of the opening in the abdominal wall, over the elevated bladder and the fundus uteri, all down the back of the uterus to the rectum. I did this by an uninterrupted suture of fine silk, making about 20 points of suture, and finishing close to the vagina and rectum. In this way the peritoneal sac was completely shut off from the torn cellular tissue of the pelvis. A good deal of sponging was necessary to remove clots of blood from the peritoneal cavity; but very little blood was lost considering the great size of the tumour and the extent of its attachments. The opening in the abdominal wall was closed by 25 silk sutures. The patient was placed in bed exactly an hour from the minute when she began to inhale methylene. She was faint and very chilly, a spray of a solution of thymol (1 in 1,000 of water) having played upon the abdomen all through the operation; and, although sponges moistened with warm thymol solution protected the abdominal cavity to some extent, the chilling effect of the spray was manifest.

Upon examining the tumour it was found that about 2 pounds of blood had drained from the vessels divided in its capsule, and at its line of separation from the uterus. Its circumference, in 3 different directions, was 52 inches at the smallest, 57 inches at the largest, and 53 inches in a third. A small piece was cut out for microscopical examination, and the tumour was then weighed in the museum of the Middlesex Hospital, and found to be 68 pounds 6 ounces. The tumour was 'chiefly composed of cells with relatively large nuclei, many containing several nucleoli of the type difficult to distinguish as distinctly muscular; but in some parts of the tumour unstriped muscle-cells were manifest.' (J. K. Thornton.) I have very little to add as to the progress after operation, except that the temperature seldom rose above 99°, only reaching 101·2° (the highest noted) once. Only 4 opiates were given. There was never any distension of the abdomen. Six days after operation, the bandage and dressing were removed for the first time. The 4 or 5 layers of thymol gauze next the skin were damp with serum; the outer layers were quite dry. The wound was united from top to bottom. All the 25 sutures were removed, and the line of union was almost imperceptible. The dressing was only changed twice after this; and, except a few drops of pus from one of the central stitchholes, union was perfect by first intention.

For a few days in the 2nd and 3rd week after operation the patient occasionally vomited, was weak and low-spirited, and there was a considerable swelling in the pelvis, as if from a hæmatocele in front of the rectum, to such an extent that the uterus could not be felt. There were frequent very offensive watery motions, but never any purulent discharge. When the swelling in the pelvis began to subside, and after washing out the rectum with thymol solution, rapid amendment set in and went on. Two days before she

left London by rail for Oxford, on April 8, just a month after operation, I carefully examined the pelvis by vagina and rectum, and really could not find any trace of an operation having been performed. The uterus was in its normal position, was movable, and of ordinary size and weight. She wrote herself in May, saying 'I am able to walk a little, and get out in the air as much as possible.' But improvement did not continue; a pelvic abscess formed, which was not opened, and she died in August.

Mural fibroid, removed with the right ovary and Fallopian tube; enucleation from right broad ligament, and thin capsule of uterine fibres; death.—In May 1882 I removed a very large uterine fibroma from a patient of Dr. Grabham, of Madeira, 50 years of age, without opening the uterine cavity, only cutting away a thin slice of the uterus close to the fundus, with the right Fallopian tube, and the right ovary, which was attached to the tumour. The anterior surface of the tumour was first exposed covered by broad ligament, which contained many very large veins. On dividing the broad ligament, avoiding the veins as much as possible, white fibroid structure was seen, covered by a very thin layer of uterine fibres, forming a sort of imperfect capsule. Cutting away the tumour from the fundus, and applying forceps to the bleeding vessels, the uterus, after the tumour was cut off, appeared almost normal in size, shape, and consistence. Some bleeding vessels on the surface of the divided fundus were secured by fine ligatures. Other ligatures were applied to vessels in the divided broad ligament. The edges of the ligament were afterwards sewn together by an uninterrupted suture, so as to cover the cut surface of the fundus. The left tube and ovary were not disturbed. The patient died 4 days after the operation, with symptoms of obstructed intestine. No post-mortem examination could be made.

EXPLORATORY INCISIONS

In addition to the cases which I have related, where the whole of a tumour has not been removed, or where an outgrowth has been removed and an interstitial growth not interfered with, I have met with cases where fibro-cystic tumours have been punctured, the cyst emptied, and nothing more done. In one case, a uterine cyst was drained successfully, the patient dying 5 years afterwards of kidney disease. In another similar case, a uterine cyst was successfully drained, but the patient died 4 years afterwards of malignant disease. In 1881, I emptied a very large uterine cyst of blood-clot in a patient of Dr. Burd, of Shrewsbury, and drained it. The patient recovered and is still in good health.

In another case, a patient of Dr. Andrews, of Hampstead, a single lady, aged 60, I was only able to remove part of a fibroma, after emptying a large cyst-like cavity. The patient died on the 3rd day. In a patient of Dr. Monro, of Newtown, Montgomeryshire, where I could only remove a projecting outgrowth from the main part of the tumour, the patient, who was in an extremely feeble condition before the operation, died on the 8th day; and in February 1885, in a lady from Newfoundland, I made an unsuccessful attempt to enucleate a fibroma which involved the left side of the fundus and body of the uterus, and was covered by the left broad ligament. I only removed a small part of a very large tumour, but the patient died on the 5th day of septic-æmia. I did not use the spray in this case, but adopted all other usual antiseptic precautions.

In a table of 31 cases of exploratory incision and partial removal of uterine tumours, published in 1882, in my book on 'Uterine and Ovarian Tumours,' in 16 cases nothing more was done than incision of the abdominal wall and removal of peritoneal fluid. In 3 cases solid tumours were simply punctured. In 1 a uterine vein was wounded. In 1 the bladder was wounded, but with only temporary inconvenience to the patient. In 1 case a nodular outgrowth was removed, the greater part of the growth not being disturbed. In this case the patient was much more benefited by the operation than could have been reasonably expected. In the cases where an incision only was made, no harm seems to have been done, and when peritoneal fluid was removed the patients were neither better nor worse than after a simple tapping. I think it very probable that if, with my present knowledge and experience, I had to treat similar cases now, I should do more than I did then. The progress of the operation has been that of gradual development during the last 25 years, and there can be

no doubt, as experience increases and the published records of cases carefully observed and truthfully recorded increase in number, that quite as certain rules for our guidance will be established as for any other great surgical operation. As in the history of ovariotomy, so in that of myomotomy, there have been periods when the general principles of intra-peritoneal and extra-peritoneal treatment have by turns fallen into discredit, and of late we have been coming to a sort of understanding that when the tumour can be removed without opening the uterine cavity, intra-peritoneal treatment is preferable; and that the extra-peritoneal treatment gives better results whenever the uterine cavity is opened. Still more recent experience, especially that of Schroeder and Olshausen, since the elastic ligature has been frequently used, appears to favour the belief that as in ovariotomy, so in myomotomy, intra-peritoneal treatment will be the rule, extra-peritoneal the exception. Here again I would repeat that this question can only be settled by careful observation, larger experience, and truthful record.

SUBMUCOUS INGROWTHS

towards or into the uterine cavity are quite as common as subserous outgrowths into the peritoneal cavity, or as intramural growths. It is not uncommon to see all 3 varieties in the same uterus, but occasionally the ingrowth is the only form of the disease. It is more commonly attended with serious hæmorrhage than either of the other forms, and the hæmorrhage is generally the symptom which leads to the examination and the discovery of the tumour. Sometimes the os is more or less dilated, and if the growth is pedicled, it may be pulled by a hook, or corkscrew, through the os into the vagina. When the os is not dilated, a sound may sometimes be passed more or less completely round the growth, showing that we have to do with an intra-uterine polypus. In other cases the cavity is more or less blocked up by a mural growth surrounding it, or projecting into it, from one side, or developed in the cervix, one or other lip of which may project downwards into the vagina.

Where fibroid ingrowths, or polypi, have a distinct pedicle, the old plan of tying the pedicle and allowing the polypus to slough away is now completely abandoned. Where the pedicle is hard, and not very large, it may be divided by the scissors, or polyptome, with very little risk of bleeding, and the polypus removed by forceps, hook, or corkscrew. In the larger and softer pedicles I know of nothing which answers so well as crushing with an ordinary lithotrite, or with Aveling's polyptrite, cutting away the polypus, and leaving the lithotrite tightly screwed on for a few minutes afterwards. I have occasionally put on 1 or 2 pairs of pressure-forceps to a pedicle, either before cutting away the polypus, or when bleeding occurred after cutting away, and have left the forceps hanging out of the vagina for several hours; and I prefer this method to the more common one of applying perchloride of iron and plugging the vagina.

Where ingrowths projecting into the uterine cavity are covered by the mucous membrane, but have no pedicle, and have been exposed after dilatation of the cervix; or when they occupy one lip of the cervix, which is thus enlarged and projects into the vagina, the mucous membrane over the projecting portion may be divided, either with the knife or with Paquelin's cautery, and ergot may be given. Occasionally in this way a sort of spontaneous expulsion of the growth is obtained. Sometimes the effect of the uterine contractions may be assisted by drawing the growth down by forceps, or hook, while by the finger, or some blunt instrument, the growth is separated from the uterine tissue in which it has been imbedded. In this way I have removed very large solid uterine ingrowths. In one case the growth was so large that after I had separated it, Dr. West put on an ordinary pair of midwifery forceps, and in removing the growth the perineum was ruptured completely through. I applied 4 sutures immediately, and union was so perfect that the patient knew nothing of the injury. I have twice had to cut up these growths into several pieces before they could be removed from the vagina, and I have several times had difficulty, after separating an intra-uterine fibroid from its attachments, in getting it through the os. Once with Dr. Lipscombe, of Tring, who had fully dilated the cervix by tents before my arrival, I had succeeded in separating the uterine attachments of an intra-uterine growth as

large as an infant's head, but could not get it through the os, which appeared to have been stimulated to contraction by my manipulation. Fearing to keep up the action of chloroform very long, we allowed the patient a few hours' sleep, and next morning, under a very deep anæsthesia, I cut the tumour into several pieces with strong scissors, and thus removed the whole. Recovery was most satisfactory, but I know of nothing that is more trying to the patience of a surgeon, or more fatiguing, than the performance of one of these operations. In 1884 I removed more than 30 pounds of a solid fibroid mass in this way, from a Spanish lady, a patient of Dr. Leeson, of Dorset Square. She was in the very lowest state of prostration from loss of blood before the operation, and the proceeding occupied fully 2 hours. In this case the result was fatal, but I feel certain that in this way there was a better prospect of saving life than there would have been by abdominal section. In May 1884, with Dr. Walker, of Maida Vale, I removed one of these ingrowths almost as large as the last-mentioned, in a similar manner, after a great part of it had become gangrenous. The gangrenous portion was removed one day, antiseptic injections used, and the remainder of the growth was withdrawn a few days afterwards. This patient is now in excellent health, and I attribute her recovery in a great measure to Dr. Walker's assiduous care in keeping up constant irrigation of the vagina and uterine cavity with a solution of perchloride of mercury—1 in 2,000—which, after many others had been tried, was found to be the only disinfectant that freed the room, or even the house, from the almost insufferable odour.

Professor Olshausen says that he has performed myomotomy in 36 cases, of whom 12 died. Nine of these cases were pedunculated, of which 8 recovered, and 1 died. There were 8 cases in which, although there was no pedicle, the uterine cavity was not opened; of these 4 recovered and 4 died. Out of 17 cases where the uterine cavity was opened, 10 recovered and 7 died. Two retro-peritoneal cases, enucleated, both recovered. In 8 cases the pedicle or the cervix uteri was secured by elastic ligature, which was left in. In 15 cases the broad ligament was also secured with elastic ligatures. In 2 cases the tumours were fibro-cystic; in all the other cases, solid. Several tumours were very large: 18, 20, 28, 44, and one 50 pounds. The cause of death in 1 case was uræmia, 1 ureter having been tied; in 1, obstructed intestine; in 4, shock; in 1, pulmonary embolism; in 5, peritonitis and septicæmia.

To sum up shortly the result of my own operative work in cases of uterine tumours from 1863, when the operations were, with few exceptions, undertaken unexpectedly in place of the ovariotomy prepared for, or in cases of diagnosis confessedly doubtful before operation, down to the later years when an accurate diagnosis has been made in almost every case, it appears that 50 uterine tumours have been removed with the result of 27 recoveries and 24 deaths.

Of the outgrowths, 20 recovered, 17 died. Where the uterine cavity was opened, 6 recovered, 3 died. Cases treated extra-peritoneally, 10 recovered, 10 died. Cases treated intra-peritoneally, 16 recovered, 10 died. 3 cases where the tumour was enucleated died. The notes of 1 case are missing, but I believe it was a fibroid with a large base, and one ovary was removed at the same time. The woman died of peritonitis.

The largest tumour was retro-peritoneal, and weighed 70 pounds—the patient recovering.

COMPLICATION OF UTERINE TUMOURS WITH PREGNANCY

It is not an unfrequent subject of consultation, when an unmarried patient or a widow has a uterine tumour, whether or not she should marry. Of course the question is much simplified if the patient has passed the child-bearing age. When under that age two questions arise. The pelvis may be so blocked by the lower segment of the tumour as to be an impediment to marital intercourse. When this is not the case, two further questions arise: the 1st, is pregnancy probable? 2ndly, if it occur, would it be dangerous to the mother, or the birth of a living child be improbable? All these questions have frequently come before me in consultation. I have known a case where an intending husband was not stopped by the assurance that not even a catheter could be passed into the vagina; just as, in another case, a young couple insisted on marrying, although Dr. Farre and I gave

a written certificate that the case was one of congenital absence of the uterus, and probably of both ovaries. On the other hand, I have known engagements broken off as soon as one of the parties was informed that a uterine tumour existed. In one case, which I attended with Dr. Farre, a widower was informed by us that the young lady he proposed to marry had a large uterine tumour, which partly blocked up the pelvis. As he persevered in his desire to marry, she was placed very fully under the influence of chloroform, and while the hips were raised, Dr. Farre succeeded, after very great difficulty, in pushing up the lower part of the tumour above the brim of the pelvis. She married soon afterwards, and Dr. Playfair attended her exactly 9 months later, delivering her of a living child without much difficulty. Considerable diminution in the size of the tumour followed delivery; the lady went to China, and I have heard that there has certainly been one child, and I believe more, since. I have known other cases where pregnancy has gone on to the full term in patients suffering from uterine tumours, even of considerable size, and I do not remember one where there was any great difficulty in consequence, nor any very unusual hæmorrhage. I have notes of 2 cases where tumours of considerable size diminished very rapidly after delivery, almost disappearing in a few weeks—cases so carefully noted by myself and others, that I could have no doubt whatever as to the fact.

In one case I was called hurriedly to a lady in great pain, and found labour so far advanced that I could not leave her. I sent for Dr. West, but the child was born and the placenta expelled before he arrived. So large a tumour remained in the abdomen that we thought it was a twin, but it proved to be a large uterine tumour, which did not retard the convalescence of the patient. This tumour was very much smaller a few months afterwards.

The question as to whether pregnancy is likely to occur must be answered in reference to the situation of the tumour, and whether the uterine cavity is much altered in its size and form. But, speaking generally, without much statistical information by which one can be guided, and doubting whether Simpson's calculation of a diminished proportion of sterile to fertile women from 1 in 10 to 1 in 8, as a consequence of the presence of uterine tumours, can be based upon a sufficient number of cases, my own experience would certainly lead me to believe that these tumours not only interfere with conception, but frequently lead to abortion—and that when pregnancy goes on, delivery will not be free from unusual dangers. The surgeon may be content with giving this information, and leave those who are interested in the question to act according to their own judgment.

The history of one patient whom I saw in 1862, in consultation with Dr. Madge, illustrates the difficulty which may arise when fibroid tumours low down in the pelvis impede delivery. The particulars were laid before the Obstetrical Society by Dr. Madge, and I quote portions of his report.

'Mrs. H., æt. 27, primipara, well-grown, in robust health, and who had gone her full time, was taken with slight labour pains on the morning of May 28. On making an examination in the after part of the day, I found the pelvis occupied by a large round tumour, which at first appeared to me to be the child's head. It seemed, however, to be lifting up, as it were, and pushing forwards the posterior wall of the vagina. It was low down, and came lower, but receding again, with every pain. It appeared to fill up every niche in the pelvis, so that the finger could not be passed round it. The os uteri could not be felt. Next day the tumour was occupying precisely the same position. The pains were still slight and not frequent, and, as the patient was in her usual health and spirits, it was considered advisable to wait. In the evening, with considerable difficulty, by hooking my finger high up behind the symphysis pubis, I was enabled to reach the os uteri; it was directed forwards, dilated to about the size of a crown piece, and, as well as I could make out, some part of the breech presented. On the following day Dr. West, Mr. Spencer Wells, and Mr. Newton met me in consultation. Pains getting more frequent. As some parts of the tumour felt soft and yielding, a trocar was introduced, and a small portion of fluid drawn off. Vain attempts had been made previously to push the tumour above the brim of the pelvis. Chloroform having been administered, and the catheter used, the opening in the tumour was

enlarged. Mr. Spencer Wells was then enabled to push the tumour upwards, and, with the aid of a blunt hook, the child was brought down by the buttock. When born it had some faint signs of life, but could not be made to breathe. In the early part of the following day the patient seemed to be doing well; as the day advanced, by fits and starts she became very excited, and could not be persuaded to lie still. Peritonitis set in in the afternoon, and she died on the 3rd day after confinement.

'*Autopsy, 18 hours after death.*—There was a little effused lymph; and underneath the viscera about a pint of bloody serum. The tumour was lying above and in a line with the uterus, nearly reaching by its upper border the epigastrium. It was attached to the posterior aspect of the fundus uteri by a long pedicle, and had thus been allowed to drop into the pelvis at or before the commencement of labour. The weight of the tumour was between 1 and 2 pounds, its diameter 6½ inches, and it consisted throughout of white fibrous tissue. Six small tumours, of the same character, were studded about the external surface of the uterus.'

It will be observed that in this case a trocar had been passed through the vagina into the substance of the tumour before the tumour was pushed up. In a case where the tumour was certainly known to be solid this, of course, would not be done. In any similar case, where the tumour was detected at an earlier period of pregnancy, either so low in the pelvis as to be an impediment to delivery, or high up in the abdomen, the question whether pregnancy should be allowed to go on to the full term, or whether premature labour should be brought on, or the uterine tumour should be removed, or the pregnant organ amputated, must be decided by the conditions in each case. I have just alluded to cases where, with very considerable tumours, natural delivery, at the full term, of a living child was recorded. But other cases have been related by Schroeder, Hegar, and Kaltenbach, where in the early months of pregnancy the tumour increased with such great rapidity, and the sufferings of the patients became so distressing, that interference was necessary in order to save life. The induction of premature labour under such conditions has proved to be so dangerous, and the emptying of the uterine cavity can be of so little use, that the removal of the tumour, so far as our present knowledge can guide us, would seem to be the better practice; and the fact of the uterus being pregnant does not seem to have added much to the difficulties and dangers of the operation when it has been performed. In one case, where a myoma about double the size of a child's head between the uterus and the liver, and several other smaller myomas, were removed from the gravid uterus by Schroeder, the patient went on to the end of pregnancy, and had a living child. In another case, where he amputated a uterus with a myoma in the fundus, about the size of an adult's head, with several smaller growths as large as an apple, or the fist, in the walls of the organ, and with a 3 months' fœtus in the cavity, the patient recovered without any fever. In a very similar case, performed at the 10th week of pregnancy, the patient also recovered, in spite of a severe bronchial catarrh. In Hegar's case, the removal of the tumour only was followed by the death of the patient. In Kaltenbach's case, tumour, uterus and fœtus were all removed, the stump was treated extra-peritoneally, and the patient recovered. In a similar case by Wasseige, treated intra-peritoneally, the patient died. Schroeder's cases were treated intra-peritoneally.

In April, 1884, Dr. Bantock operated on a lady who had been some time under notice, and whose case was diagnosed as one of multiple uterine fibroids. He found the uterus encumbered with 2 tumours, 1 large cystic tumour from the left angle of the fundus, and another, more solid, but also partially cystic, from the right angle of the fundus. The uterus contained a fœtus of 3 months. Supra-vaginal amputation and extra-peritoneal treatment resulted in the complete recovery of the patient, who at the end of the year was known to be in good health.

Two cases illustrating this subject have also come under the management of my colleague, Mr. Thornton, in the Samaritan Hospital. The first patient was a married woman, 39 years of age, in an advanced stage of pregnancy. In May, 1879, he removed a tumour, attached by a pedicle to the right side of the uterus, and otherwise slightly adherent to it, and not only wedged in the pelvis,

but firmly fixed to the brim and the whole of the pouch of Douglas. The pedicle was first clamped, then tied, and returned. Labour came on about 9 hours afterwards, and the child was still-born without any difficulty. The woman survived till the 5th day.

The second operation was in July, 1882. Patient married, 38 years of age, had carried a large tumour for 7 years, and was very ill, with no chance of going on to the full term. Extensive adhesions had to be separated. An elastic ligature was passed round the cervix, and large forceps were placed on each broad ligament. The uterus, appendages, and tumour were all cut away, the elastic ligature was replaced by Kœberlé's serre-nœud and the stump fastened in the lower corner of the wound. The patient made an excellent recovery, was up on the 18th day, left the hospital about the middle of August, remained under care for another fortnight, and then went into the country. She, however, died about 3 weeks after her return home, with obscure symptoms of renal or intestinal obstruction.

REMOVAL OF THE OVARIES IN CASES OF UTERINE TUMOURS

The alternative proposal of removal of the ovaries in order to lead to premature cessation of menstruation in cases of uterine tumour attended with much bleeding, should always be considered during consultation, where surgical treatment is called for. And it is occasionally advisable to recommend that an operation should be begun with the understanding that if the tumour can only be removed with great difficulty and danger, it should be left alone, and the ovaries removed. Whereas if the tumour can be removed without any unusual hazard, with or without one or both ovaries, it should be taken away. In one of the cases which I have just related, finding that there would be unusual difficulty, I intended to remove the ovaries, but there was so much bleeding after removing one and such difficulty in stopping the bleeding, that I removed the tumour. Sometimes the ovaries are so situated in these cases that they can be easily removed; in others they are so confounded with the tumour that it is difficult even to find them. After their complete removal, the rule is that menstruation is stopped, and not only excessive loss of blood at the menstrual periods, but bleeding from the uterus at other times, supposing there to be no polypus, is also stopped, and diminution of the tumour goes on more or less rapidly. In July, 1883, I operated upon a patient of Dr. Macintosh, of Brompton, who had a very large, solid uterine tumour, and was extremely enfeebled and pallid from repeated hæmorrhage. I took away both ovaries with a most satisfactory result; hæmorrhage never reappeared after the operation, and a considerable diminution in the size of the tumour has been observed. Dr. Mackintosh saw his patient in the summer of 1884 in excellent health, there having been no return of menstruation, and scarcely any abdominal tumour to be felt. In a similar case, but smaller tumour, in a young lady, a patient of Dr. Priestley, we decided, after consultation, upon the alternative extirpation of the enlarged uterus, or of removal of the ovaries. After making an exploratory incision, removal of the ovaries appeared to present the fewer difficulties, and to offer the best chance of safety to the patient. This was done, and the result has been most satisfactory. The operation was performed in 1881. I saw the patient in the summer of 1884 in excellent health, and I could scarcely find a trace of the tumour, which, at the time of operation, had extended some inches above the umbilicus.

We must have further experience, and a larger number of cases carefully recorded, before we can arrive at a fair estimate of the relative value and danger of the two courses of action in cases of this kind. The question whether the ovaries only, or the ovaries and Fallopian tubes should be removed, must be decided by the condition of the tubes. If healthy, it would be absurd to remove them; but if diseased they should with equal certainty be taken away, whether free or adherent. It is very important that every fragment of both ovaries should be completely cleared away. If adherent, and one or both are twisted or scraped away from their connections, if only some very small portion be left, menstruation may afterwards occur quite regularly, and the operation prove more or less a failure, even though both Fallopian tubes may have been totally removed.

It is to be hoped that, in recording cases, surgeons will be as careful as possible in giving the dimensions of the tumour before the ovaries were removed, and the dimensions at certain definite periods afterwards. In September 1884, Dr. Harvey brought two interesting cases before the Calcutta Medical Society, in which he had removed both ovaries, which were quite healthy, on account of uterine tumours. One of these tumours was accompanied by excessive menorrhagia, the other by dysmenorrhœa and interference with action of bladder and bowels. In the first case the tumour was about 5 inches across between the Fallopian tubes. The tumour 'practically disappeared within 6 months.' In the second case the uterus at the time of operation was as large as at the end of 7 months' pregnancy. Within 3 months 'the uterine tumour had shrunk to half its former size.' Dr. Harvey does not appear to have touched the Fallopian tubes in either of these cases. In a third case, where the uterus reached within $\frac{1}{2}$ an inch of the umbilicus, both ovaries were removed, the right 'with difficulty along with the thickened tube.' The patient died on the 9th day, of peritonitis and septicæmia. Dr. Harvey adds, 'The objection to the operation that it unsexes the woman and makes it impossible for her to have children, is sufficiently met by the fact that in the cases when the operation is justifiable the woman is in the last degree unlikely to conceive, and it would be very unfortunate should she do so.'

In August 1884, at the meeting of the International Congress at Copenhagen, Dr. Wiedow, of Freiburg, showed that of 149 cases of castration for uterine growths, 15 died—a mortality of about 10 per cent. Comparing this with the much larger mortality of myomotomy, he argues that castration must be the better practice if the results are proved to be good; and he shows, by an analysis of the cases, that the results, both as regards stopping of the bleeding and shrinking of the tumours, have been generally satisfactory, and that removal of the Fallopian tubes has little or no influence upon the results. He insists that complete removal of both ovaries is of the utmost importance; for, when any portion of either ovary has been left, even if both Fallopian tubes have been removed, menstruation has recurred quite unmodified by the operation.

TUMOURS OF THE FALLOPIAN TUBES

Another class of abdominal tumours is found in the form of enlargement of the Fallopian tubes. Tumours of the Fallopian tubes, though generally taking the form of distended sacs, are not always cyst-like. They are sometimes solid. When the contents are fluid, they vary as to their nature. We may range tumours of the Fallopian tubes in the following order:

1. Dilated tubes containing clear fluid.
2. Dilated tubes with purulent contents.
3. Dilated tubes containing blood or menstrual fluid.
4. Tubes enlarged by papillomatous growths.
5. Tubes enlarged by fibrous deposit.
6. Tubes including the products of conception.

Numbers 4,571 and 4,572 in the Museum of the College of Surgeons are specimens of these tumours, formed by dilatation of the Fallopian tubes, which I removed in 1877. These tubes were both distended with fluid. The patient, single, 23 years of age, was admitted into the Samaritan Hospital in July 1877, with an abdominal tumour, which extended midway between the umbilicus and ensiform cartilage, and under the left false ribs, drawing the bladder upwards, and pushing the uterus downwards. Douglas's pouch was filled by a solid mass which moved with the abdominal tumour. The catamenia were regular. The tumour had only been noticed about 9 months before, but steadily increased. It was supposed to be a multilocular ovarian cyst. On opening the peritoneum, 2 tumours separated by a deep furrow were seen. That to the right was first turned out without being opened. A ligature was applied upon a very narrow neck, which proved to be the closed uterine end of the right Fallopian tube. This was divided beyond the ligature. A very similar dilatation of the left Fallopian tube was treated in the same manner. Both Fallopian tubes, closed at both ends and dilated into cyst-like tumours, were removed without being tapped or opened. The right ovary was removed with the right tube. The left ovary was not disturbed. The weight of one tumour was 4 pounds 11 ounces,

of the other, 1 pound 6 ounces. There was nothing in the fluid contained in either cyst to distinguish it from ordinary ovarian fluid. The woman recovered well, left the hospital 3 weeks after operation, married in April 1878; and I saw her in September 1881, in good health, the catamenia having been quite as regular as before operation, but more copious. In Mr. Doran's account of the preparations in the Museum of the College of Surgeons, he says: 'Several pedunculated cysts sprang from the broad ligament. Some of the cysts contained vegetations similar microscopically to the papillomatous growth from the interior of the Fallopian tube which will shortly be described.' Mr. Doran is here referring to the following very remarkable case.

In the autumn of 1877, a maiden lady, a patient of Mr. Bickersteth, of Liverpool, began a long illness with tumefaction of the abdomen and an attack of right ovaritis. She was tapped. This was followed, in the spring of 1878, by pleural effusion on the right side. 120 ounces of clear fluid were removed by tapping. Then the ascitic fluid re-collected at the end of 2 or 3 months. Tapping to the extent of 24 ounces. In another 3 months the right pleura again required tapping, 100 ounces of fluid being removed. Three months more, the abdomen had a third time become swollen, and 16 pints were drawn off. But throughout the period of these alternating pleuritic and peritoneal effusions, and ever since the subsidence of the original symptoms of pelvic inflammation, there had been neither acute disturbance of the system, nor even a rise of temperature; and after each tapping recovery appeared for a time to be complete. No signs of heart or liver disease. The last tapping was done in January, and in March, 1879, as the case was as obscure as ever, the patient was referred to me. Mr. Bickersteth had detected a dull note on percussion in the flanks, most marked on the right side. The abdomen was again full, and there was also some fluid in the thorax. So I advised an exploratory incision. This was objected to, and the abdomen was simply tapped. The fluid had a sp. gr. of 1032, was charged with albumen, and the scanty deposit gave evidence of vacuolated cells, indicating some proliferating disease. The tapping, however, enabled me to detect a hard, nodular mass behind the uterus, which organ was freely movable, and so low in the pelvis that the cervix lay close to the vulva. An operation was imperative, and I opened the peritoneum in April 1879. Seventeen pints of opalescent fluid escaped. The left ovary was normal. To the right of the uterus, not larger than natural, a tumour was found the size of an orange, and consisting of the greater part of the right Fallopian tube, with the ovary behind it. A ligature was applied between the tumour and the uterus, and the tumour was cut away. The ovary was also removed after ligature. No secondary deposits were found on the peritoneum. The patient made a rapid recovery.

A small, thin-walled cyst projected from the surface of the ovary, which was not otherwise diseased. About an inch of the innermost portion of the Fallopian tube remained undilated and quite pervious. The other part formed an elongated tumour, $3\frac{1}{2}$ inches long, with the fimbriated extremity quite open, and the fimbriæ, although thickened and shortened, remained quite distinct. The distended section of the tube was filled with cauliflower excrescences, which grew from all parts of the mucous membrane. Several cysts, with thin walls and smooth exteriors, rose by narrow pedicles from amidst the excrescences, and contained papillary outgrowths. The cauliflower growths were covered with countless secondary offshoots, and on the free surfaces there was a single layer of columnar epithelium, a few of the cells being ciliated. The blood supply was scanty, and in some parts of the stroma chondrification had taken place. The disease had begun with local inflammation, causing hyperplasia of the tubal mucous membrane, developing into the warty and papillary growths, and accompanied with an acrid mucous secretion. This escaping by the open end of the tube, caused the morbid effusion of the peritoneum, and the abundant ascitic fluid. The cells found in the fluid were epithelial, the growth was epithelial, confined to the free surfaces, and there was nothing in it of a cancerous character.

The patient had another attack of pleurisy in the following autumn, has ceased to menstruate, and in 1884 still lives in good health, without any signs of the reappearance of the papillary growth

in other parts, or of any fresh formation of ascitic or pleural fluid.

This is the only case of papillomatous tumour of the Fallopian tube that I have ever removed, and the case previously related is the only one in which I have removed tubes dilated into cyst-like cavities during my 20 years' practice at the Samaritan Hospital. I saw one case in consultation in 1884, which was afterwards operated on by Mr. Thornton, and another which I removed myself in October, 1884. The tube in this case was quite closed at both ends, and the central portion of the tube was dilated into a thin-walled, cylindrical, cyst-like body, which had a remarkable resemblance to intestine. A single ligature at the uterine end of the tube was all that was required before cutting away the tumour. The uterus, the other tube, and the ovaries appeared to be quite normal. The cavity contained about 2 pints of fluid, closely resembling some variety of ovarian fluid. It also contained a great deal of cholesterine. The dilated tube is now in the Museum of the College of Surgeons. The patient recovered without any fever, menstruated freely from the 4th to the 8th day after the operation, left for Yorkshire on the 21st day, and I have had grateful letters from her since.

Considering how very frequently I have performed the operation of ovariotomy, it seems remarkable that these four cases are the only examples I have met with where either one or both Fallopian tubes have been so diseased as to lead to their removal. I have reported many cases where, in connection with ovarian tumours, a Fallopian tube has been considerably elongated, and its canal closed. In one case it was dilated and formed a channel of communication between a bleeding ovarian cyst and the uterine cavity and the vagina; but I have never seen anything supporting the opinion that disease of the Fallopian tubes occurs with anything approaching the extraordinary frequency with which by some it is alleged to occur. When treating the pedicle as formerly by the clamp, and recently by the ligature, I have been guided, as to including the tube or not, simply by the ease with which one or the other could be done. When the Fallopian tube is closely attached to the cyst I usually include it in the clamp or ligature. But if the pedicle can be readily secured without including the tube I leave it. I have scarcely ever been decided in this matter by observing signs of disease in the tube itself, although I remember occasionally, though not very often, having removed it because it appeared unusually red or swollen, elongated or tortuous.

No doubt the tube occasionally becomes the seat of gonorrheal inflammation; but, whatever may be the experience of others, my own observation would lead me to believe that these and other cases of so-called salpingitis, or pyo-salpinx, usually recover under ordinary care and rest, without surgical treatment. It would appear to me as rational to perform castration in every case of gonorrheal orchitis, as to remove the Fallopian tubes simply because they are inflamed or the seat of suppuration.

Those who wish to know more about the diseases of the Fallopian tubes, since the time of their discoverer—Fallopius, 1550—and of Haller, Bartholine, Ruysch, Morgagni, Cruveilhier, will do well to consult Hennig's work on 'Diseases of the Fallopian Tubes and Tubal Pregnancy,' published in 1876. They will there find a great deal of valuable information as to congenital and other defects, dilatation, atresia, adhesions, abnormal contents, catarrh, inflammation, and new formations; while the chapter on tubal pregnancy contains a very complete bibliography, and some historical notices of recorded cases from 1604 downwards. The section on the pathological anatomy includes notices of interstitial, tubal, tubo-ovarian, and tubo-abdominal pregnancy. The sections on diagnosis and treatment are less satisfactory, and do little more than confirm the conclusion to which experience here has been leading, that, whenever the diagnosis of tubal pregnancy can be made out with tolerable certainty, the risk of rupture as pregnancy advances, and of death from internal hæmorrhage, is so great, that the removal of the dilated tube by abdominal section is the safest and best practice. But here again my own experience is very small. With the exception of one case, recorded by Mr. Cooke, in the 5th volume of the 'Obstetrical Transactions,' where an intra-uterine and an extra-uterine pregnancy went on together to the full term; and another case recorded by Mr. Doran, where a ruptured tube containing an ovum was found after the death of the patient, I

am not sure that I have ever seen any variety of extra-uterine fœtation, either in my own practice or in consultation.

The last work on tubal pregnancy, by Dr. J. Veit, of Berlin, published in 1884, contains interesting observations on the connection of tubal pregnancy with hæmatocele, and upon the diagnosis and treatment of tubal pregnancy. The general conclusion he comes to is, that in uncomplicated tubal pregnancy the sac should be extirpated; but when a hæmatocele has formed, or the fœtus is dead, that rest and expectation are to be recommended. When rupture into the peritoneal cavity has taken place, he advises compression of the aorta, and only under extreme necessity, direct stoppage of hæmorrhage by laparotomy. My own feeling would be that, in any case of hæmorrhage from rupture, although compression of the aorta might be useful in temporarily stopping bleeding while the necessary preparations for laparotomy were being made, this operation had better be resorted to as soon as possible.

TUMOURS OF THE ROUND LIGAMENT

I have only twice seen the round ligament, as it passes along the inguinal canal, so enlarged as to form a solid tumour; and by a curious accident both patients came to me in the same year. I never saw a case before that time, and I have never seen one since. Both were on the right side, and both had led to great difference of opinion among men of large experience, the majority looking upon them as malignant tumours. About the first, I was myself very doubtful; but I felt confident that it could be removed without difficulty; and the patient was otherwise so healthy that I would not believe it possible that the tumour could be malignant. A linear incision through the integuments exposed a fibroid tumour considerably larger than an orange, which was very easily removed, and proved to be the round ligament enlarged just after it passed through the internal ring. It is now in the Museum of the College of Surgeons. The structure precisely resembled that of a uterine fibro-myoma. The patient rapidly recovered, and is still after many years in good health.

The second case occurred very soon after the first, and I was able to give a correct diagnosis. This tumour was rather larger, of the same structure, and is also in the College Museum. The patient recovered without difficulty.

Much more commonly than solid tumours of the round ligament, cystic tumours are found in the inguinal canal of women, and are known as hydrocele of the round ligament. I have seen them of various sizes, from that of a walnut up to a cyst capable of holding 10 or 12 ounces of fluid. I have no notes of these cases, but I must have tapped at least 20, and the fluid has always resembled that of hydrocele in the male. I have once known the fluid collect again. In that case I injected iodine with complete success. In all the others, so far as I know, simple tapping was followed by a cure. Anatomically the cystlike cavity in which this fluid forms is supposed to be a dilatation of the tubular process of peritoneum into the inguinal canal, which in the fœtus is called the canal of Nuck. These cases are frequently mistaken for oblique inguinal hernia, but the diagnosis is easy. There may be impulse on coughing, but the tumour is not altered by the position of the patient, and it cannot be reduced; there is no gurgling on pressure, and the percussion note is dull. When large, fluctuation is perceptible, and in thin women transparency may sometimes be made evident.

CHAPTER II

ON PARTIAL AMPUTATION AND ON COMPLETE EXCISION OF THE UTERUS

THE removal of fibroid tumours of the uterus and the partial amputation of the hypertrophied uterus, have led on to its more or less complete extirpation in cases of uterine cancer. The names of Blundell and Freund are associated with these operations. More recently Porro has supplemented the Cæsarean section by

the removal of the upper part of the uterus leaving the vaginal portion after amputation at about the division between the neck and the body of the organ. The case which I am about to describe is not identical with any of these proceedings. It was not a supra-vaginal amputation, but a complete taking away of the whole gravid uterus and its appendages. Even if I had followed Porro's example it would have been the first case of the kind in Great Britain. But cutting round the neck into the vagina and leaving no stump makes the following case of excision of a gravid cancerous uterus not only the first excision of the entire gravid uterus in this country, but an operation unique in its mode of performance, completeness, and success.

Bischoff, of Basle, in 1879 removed a uterus, the cancerous cervix of which impeded delivery, from a patient 41 years of age, and at the 34th week of pregnancy. She, however, died 11 hours after, the left ureter having been tied. It thus seems that my own case at present is the only one of the kind followed by recovery and a temporary restoration to health.

The patient was a farmer's wife, 37 years of age, pregnant 6 months with her 6th child, and suffering from epithelioma of the cervix uteri. She was brought to me for consultation at my house by Dr. Goldsworthy Tucker, of Farningham, on October 5, 1881. She had borne a child 16 months previously, had nursed it for 3 months, became weak and troubled with vaginal discharge, but again became pregnant, and aborted at 6 weeks, towards the end of 1880; again menstruated in March, April, and May 1881. The exact date of the last conception is doubtful, but the calculation must be made from the month of May. At her first visit to me she was quite conscious of the movements of the child, ballottement was distinct, and I could hear the sounds of the fœtal heart. The cervix uteri was long and enlarged, the os admitting one finger easily for 1 inch, and the cervical canal was surrounded by a mass of epithelioma, which everted the lips of the os and projected downwards into the vagina. Proposals for the inducing of premature labour and for the removal of the diseased cervix had already been discussed in previous consultations with Dr. Playfair; but it seemed to me that the disease was so distinctly limited to the cervix that if all the morbid tissue were scraped away and chloride of zinc applied to the denuded surface, pregnancy might go on to the full term. And this procedure was decided upon. A few days more, however, reduced the patient to such a state of pain and weakness, with great increase of the discharge, that we were called to review with Dr. Graily Hewitt the various objections and advantages of the different courses open to us. Our deliberations ended in the decision that it would be better to remove the whole uterus and its contents, and I accordingly performed the operation on October 21, with the assistance of Mr. Thornton and Mr. Doran; Dr. Graily Hewitt, Dr. Tucker, and Mr. Cadge of Norwich being present.

The patient was secured as for ovariotomy; but, as it was necessary to keep a catheter in the bladder, an opening was made expressly for it in the waterproof covering. The vagina was plugged with thymol cotton, wetted with warm water containing about 1 per cent. of phenol. I divided the abdominal wall in the middle line to an extent of about 8 inches, from 2 inches above to 6 inches below the umbilicus. The uterus thus exposed was about the size of a large adult head. After turning it out I inserted 4 sutures in the upper part of the wound over a large flat sponge, so as to keep back the intestines and protect the abdomen from needless cooling by the spray. I found the ovaries at a higher level and nearer to the fundus than was expected, and it was quite easy to secure the spermatic artery, first on the left and then on the right side, by transfixing the broad ligament below each ovary and tying with strong silk. I took the catheter as my guide in dissecting the bladder from the anterior surface of the uterus. The expanded uterine coats were very thin, like a tense cyst, and they were soon accidentally ruptured. I punctured the protruding membranes and a quantity of liquor amnii escaped. The next thing was to draw out the fœtus, and tie and cut the cord; but I did not interfere with the placenta. I then separated the attachments between uterus and vagina, completely circumcising the neck, and securing by pressure-forceps all bleeding vessels as they were divided. The entire uterus, with all the diseased parts about the os

and cervix, was thus removed. The forceps were then taken off successively, and every bleeding vessel tied with carbolised silk. Then, taking out the vaginal plugs, I brought together the opening into the vagina, and the edges of the divided broad ligaments, with silk sutures. The pelvis was carefully cleansed, the wound closed as usual with silk sutures, and the ordinary dressing applied as after ovariotomy.

The patient was under the influence of methylene for about 75 minutes, but the operation from beginning the incision to closing the wound was completed within an hour.

Mr. Cadge kindly noted the time occupied by the different stages of the operation as follows:

2.35 P.M. Patient began to inhale methylene.
2.41 P.M. Catheter and plugging vagina.
2.50 „ Incision in abdominal wall.
2.53 „ Uterus drawn out.
2.56 „ Sutures in upper part of abdominal wall, dividing broad ligaments and vagina, removing fœtus and securing vessels, till
3.10 „ Uterus removed.
3.40 „ Ligature of vessels and sutures of vagina and broad ligaments.
3.50 „ Closing of wound and dressing.
3.55 „ Patient in bed.

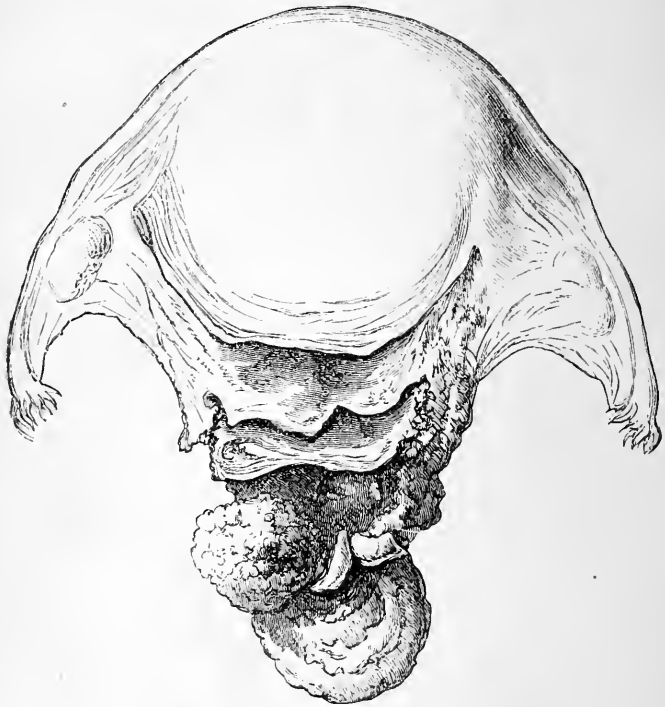
The uterus has been preserved in the Museum of the Royal College of Surgeons, and the accompanying drawings are back and front views of the preparation.

The first of these drawings shows the posterior aspect of the entire uterus and ovaries as they were removed. The shred of peritoneum seen hanging near the central part of the diseased cervix was stripped from the anterior surface of the rectum.

The second drawing is a view of the anterior surface, showing where the peritoneal covering of the uterus was divided, just where it is reflected on to the bladder. Just below the line of divided peritoneum a darker line shows the opening into the uterine cavity through which the fœtus was drawn out. Below, in both drawings, the cervix altered by epithelioma is very well depicted.

Mr. Doran reported that the uterus and its appendages, when removed, 'weighed 25 ounces exclusive of the fœtus, and measured 6 inches in length.'

'The upper part of the uterus presented no abnormal appearance; anteriorly, immediately below the line of reflexion of the peritoneum on to the bladder, was a perfectly horizontal lacerated wound, about 2 inches in width, opening into the uterine cavity. The cut ends of the uterine artery could be seen, on each side, entering the uterus at its lateral and inferior part, between the anterior and posterior peritoneal coverings. The os was completely encircled by a cauliflower growth which extended very little into the uterine cavity, but invaded the cellular tissue to the right of the cervix. The portion of vaginal wall removed formed a complete but very narrow fringe round the new formation. This growth, when examined microscopically by Mr. Eve and myself, showed all the characteristics of epithelioma. The right ovary contained a large corpus luteum of pregnancy, the left showed two corpora lutea in process of atrophy; the stroma of both was normal and free from dilated follicles.



'The fœtus weighed 22½ ounces, 2½ ounces lighter than the uterus and its appendages; it measured 11 inches and was ill-nourished, its body covered with a fine down, its eyelids gummed together, and its nails not extending to the tips of the fingers; the cord was 9½ inches in length. The conclusion would be that it was about a week over the 6th month after conception.'

The condition of the patient after the operation was pretty much what we see in cases of ovariotomy; rather more pain and sickness than in a simple case, but less than in very complicated cases. Three small opiates were given within 6 hours after the operation. Sickness remained troublesome during the first week, and the patient was nourished with injections of beef-tea and port-wine, with a little laudanum occasionally. The highest temperature was 101·2°, and the most rapid pulse 128. During the night between the 28th and 29th, 8 days after the operation, opening of the wound happened from frequent vomiting; but the stitches were carefully replaced by Mr. Thornton in my absence, and, though the temperature rose soon after a degree higher than it had been, the sickness ceased in the afternoon.

After this, though some of the stitches once more cut through, and the patient was kept in a state of irritation by an accidental

scald on the leg by a hot-water cushion, there was not much to remark beyond a rather free discharge of serum from the vagina, which afterwards became purulent, and ceased within the third week. Twenty-eight days after operation she was moved into another room, but before this the pulse, temperature and digestive functions had been quite normal. Urine passed freely; she had neither pain nor sickness, and she slept well. She returned to her home in Kent, by road, on November 21. When asked in what respect this confinement differed from those of her 5 children, she said she had always suffered from vomiting, but more this time than ever before; that the chief difference was that she had no trouble this time with her breasts, and that the most pain was from the scald on her leg. Her husband called on me in the first week of 1882 and told me that she was in good health, gaining strength, enjoying life, and had no vaginal discharge, pain, or irritation. This case then distinctly proves that a patient may recover after complete excision of a gravid uterus and both ovaries, and Mr. Doran's inspection and report of the specimen in the College Museum encouraged us to expect that as the diseased part had been completely removed, there might be a considerable prolongation of life, as in cases of epithelioma of the lip or anus, where many years often elapse without any new morbid growth, and to be hopeful that the patient might escape a recurrence of the disease. But she came up to see me 3 times, at intervals of a fortnight, in February and March 1882, with a very suspicious thickening of the vaginal cicatrix, although the general health was steadily improving. I saw her again in London in the summer, the disease evidently recurring and extending upwards. At length a considerable mass formed in the left iliac fossa, and she died 13 months after the operation.

If I were to perform such an operation again I should modify its successive steps according to the gravid or non-gravid state of the cancerous uterus. When non-gravid, recent experience serves to prove that extirpation by the vagina is the safer method. When gravid, it is possible that dilatation of the cervix and emptying the uterine cavity as a preliminary measure might still enable the operator to act through the vagina. No case so treated, as far as my knowledge goes, has been recorded, and it is not easy to estimate the amount of risk which would have to be encountered. It seems probable that in nearly all cases of gravid cancerous uterus, either the abdominal, or a combined vaginal and abdominal, operation would afford the greatest chance of success. In either case a large elastic catheter or a canula, through the end of which diverging wires expand, like, but shorter than, those figured on page 44, would serve as a guide and safeguard in separating the uterus from the bladder; and if the abdominal operation should be selected, a large ring pessary, or a modified Zwancke's pessary, in the vagina, would afford better help in making the section of the vaginal wall round the neck of the uterus than the cotton plugs which I used. Of course the vagina ought to be thoroughly cleansed by sulphurous acid or some other disinfectant.

The position of the patient during the abdominal operation should be the same as for ovariotomy, but for a combined vaginal and abdominal operation it would be convenient to separate the thighs and flex the legs, carefully protecting them from cold. In any case a strong reflecting lamp should be provided and ready for use—say, for example, a good carriage lamp or a policeman's bull's-eye, until a cool, glowing electric light is perfected, such as we may obtain by means of an accumulator, and one of the incandescent lamps recently described and used by Dr. Felix Semon. Something of this kind, particularly if the spray be used, would aid greatly when vessels are being tied or sutures passed, unless the light in the room is unusually strong.

The length of the incision in the abdominal wall need not be so long as that which I made, if, after exposing the uterus, the liquor amnii were evacuated by a trocar. The uterus might still further be diminished in size by dividing its wall and removing the fœtus, but it would be very desirable to avoid any interference with the placenta. In Porro's supra-vaginal amputation an elastic ligature passed round just above the vagina might be used with advantage, but this of course is out of the question if the cervix has to be removed.

After withdrawing the uterus from the abdominal cavity a few sutures should

be inserted so as to bring together the edges of the upper part of the opening in the abdominal wall, and close it over a flat sponge. This prevents the intestines from escaping, and protects them from the cooling of the spray when it is used. I do not think I need say more about the suppression of hæmorrhage by tying the spermatic arteries or the use of pressure-forceps than will be found in my narrative of the case. By careful dissection, and the guide of a catheter, the uterus may be separated from the bladder without much danger, but I do not yet see any mode of certainly providing against the mischance of tying or dividing one or both ureters. I fear that, with all possible care, it is an accident which may occasionally prove unavoidable.

Mr. Nunn suggested to me last year that removal of the entire uterus would be more easy if the organ were first divided into two parts by cutting it through in the median line and removing first one half and then the other. He founded this proposal on his anatomical observations brought before the Pathological Society in 1857, and published in the ninth volume of the 'Transactions.' Professor Müller, of Berne, has more recently made a similar recommendation, as a modification of total extirpation of the uterus by the vagina. He has not carried his proposal into practice; but he thinks that the necessary ligatures would be more easily applied and be much less likely to slip if, after drawing down the uterus, it can be 'split into two symmetrical halves in a vertical direction. Then each half of the uterus with its ligament could be drawn backwards,' the ligatures applied, and the uterus cut away ('Centralblatt für Gynäkologie,' 1882, No. 8).

When the abdominal operation is performed, my own present feeling is in favour of the intra-peritoneal method of securing the vessels, with suture of the peritoneal edges, and complete closure of the incision in the abdominal wall. Olshausen's recent experience with the elastic ligature, proving that the ligature and the parts compressed by it may be left within the abdominal cavity with most encouraging results, strengthens my impression in favour of the intra-peritoneal ligature. But I freely admit, at the same time, that recent cases by Dr. Bantock, Mr. Thornton, and Mr. Meredith prove that the extra-peritoneal treatment of the pedicle, or of the root of outgrowths from the uterus, or portions of the uterus included in a ligature or compressing wire, may be very safely and successfully effected by Kœberlé's serre-nœud, which is used as a clamp, and prevented from being drawn inwards by two strong pins passed through close to the wire loop, as shown in the preceding chapter. The edges of the wound are then carefully closed around the stump.

Most operators have thought it necessary to arrange for drainage after separating the uterus from its vaginal attachments all round. But I do not see that drainage can be more necessary in this operation than after the removal of uterine or ovarian tumours, where I have almost completely abandoned it. I believe it to be more important effectually to close the opening between the peritoneal cavity and the vagina by sutures, than to use a drainage-tube. Indeed, I should very much fear that the latter course would be hazardous. It has also been proposed to use two sets of sutures, one for the vaginal mucous membrane and one for the peritoneum and broad ligaments. My present feeling is that the vaginal sutures are unnecessary, and may possibly be injurious by leading to collections of blood or serum in the pelvic cellular tissue.

As I have never performed either a vaginal or a combined vaginal and abdominal operation for the removal of a non-gravid uterus, I hesitate to say much about the details of the procedure; but I think it extremely probable that the operation as hitherto practised might be very much simplified by drawing down the uterus, separating its attachments to the vaginal wall all round as near to the uterine substance as possible, or exactly where the peritoneum is reflected off from its walls, securing any bleeding vessel as it is divided by pressure-forceps, not using any ligatures, but leaving the forceps hanging out of the vagina for 2 or 3 days until all danger of hæmorrhage has ceased. Since I first published this suggestion, it has been successfully tested by more than one operator; not altogether superseding ligatures, but supplementing them where ligatures could not be easily applied. The forceps might be so arranged or tied together as to serve the double purpose of stopping bleeding and of bringing the opposite

sides of the vagina together, to render peritoneal sutures superfluous. It is very unlikely that if the forceps were left untouched for 2 or 3 days any bleeding would take place; and if it did, there would be no more difficulty in applying a ligature than in the first instance. Further, it appears to me that sufficient attention has not been paid in any of these operations to preliminary compression of the abdominal aorta by tourniquet as a safeguard or preventive of bleeding, or to compression of the aorta by the fingers of an assistant when bleeding occurs during the progress of the operation. It is also probable that Mr. Davey's plan of compressing the iliacs by a sound passed up the rectum might also occasionally prove useful. I can imagine it to be quite possible in persons where the abdominal wall is lax, either by a modified tourniquet or by the hand of an assistant, so to force the parietes backwards and below the brim of the pelvis, as to push the uterus downwards, keep the intestines in the upper part of the abdominal cavity, and at the same time to check the circulation in the aorta or the iliacs, and thus render the operation almost bloodless.

More than 50 years ago, Blundell, after long consideration, based upon a series of experiments to show the effect of peritoneal section and manipulation, and fully aware of the difficulties and risks of the operation, proposed excision of the cancerous uterus. He brought forward his views with no very sanguine expectations, and simply advocated the extirpation as a last resource, which might perchance restore a measure of life to a few of the many women who were menaced with speedy and inevitable death. He carried out his proposition for the first time in September 1828. He did 4 cases, 3 of which proved fatal—2 within 6 hours of the operation, 1 after 39 hours—and 1 lived a year, when on examination cancerous masses were found in the pelvis. All Blundell's operations were performed through the vagina. A very interesting account of them, and of the thoughts and experiments which led him to attempt them, may be found in his work on 'Obstetric Medicine,' published in 1840, from page 752 to page 784.

Three deaths out of 4 cases, and a recurrence of the disease within a year in the only patient who recovered, will account for the fact that the idea of extirpation of the cancerous uterus was not revived in England until 1878, when, in the Hunterian Lectures at the College of Surgeons, I made known Freund's operation of excision through the abdominal wall. It has not yet been done in England with any good results. In 2 instances of which I heard, death followed after a short interval; and it cannot be said to have proved successful in Germany and Italy. The experience of Freund himself and other operators up to the end of 1880 has been collected, and Olshausen has commented on the particulars of 94 cases. Of these 24 survived the operation; but in nearly every case there was a return of the disease, and in some of them after a very short time—an experience corresponding almost exactly with that of Blundell. Among the fatal cases some died of shock, some from bleeding, and others from septic peritonitis. Six times one of the ureters was divided. In 2 other cases the same accident befell both ureters, and 4 of the operations were never completed. Immediate consequences so discomfiting, and results so negative, led to other modes of excision. Delpech had a long time before, in 1830, indicated a combined hypogastric and vaginal operation, and excision by the vagina came again to be adopted. Olshausen has accumulated the history of 44 such operations, showing an outcome of 29 recoveries, 12 deaths, and 3 incomplete operations. We have here an advance of more than 40 per cent. in favour of this procedure, the relative mortality being for the abdominal section about 75 per cent.; that for the vaginal extraction not quite 30 per cent. In his own practice Olshausen informs me that he has had 34 cases of total extirpation of the uterus by the vagina up to the end of 1884, with 7 deaths—3 from sepsis, 2 of shock, 1 carbolic poisoning, and 1 iodoform poisoning. Besides these, 1 patient, after a rapid recovery, died quite suddenly on the 26th day, of pulmonary embolism. Three cases could not be completed on account of firm adhesions between the uterus and rectum or bladder. Among the cases where there has been no reappearance of disease, 2 years have elapsed in 2 cases, in 1 case $2\frac{1}{2}$ years, and in 2 cases 3 years; but in a larger proportion there has been reappearance in between 1 and 2 years.

Professor Billroth of Vienna, in a letter

to me, dated Vienna, November 18, 1881, says:

'Your Porro-Freund case has interested me very much, as a similar case occurred to me 3 months ago. A strong woman, about 37 years of age, 4 months pregnant, had extensive carcinoma of the whole cervix and part of the vagina. The whole uterus was extirpated by the vagina. Bleeding was considerable, but recovery was rapid. Unfortunately it was necessary to cut away part of the bladder, leaving a hole in the bladder, and a large hole (*Riesenloch*) in the peritoneum. I stopped up both with plugs of iodoform gauze. These were left for 8 days, and were then removed. There was no sepsis, but healing. The vesical fistula remains for future treatment. In another case, similar except that the uterus was not gravid, one ureter was wounded. The large peritoneal opening was plugged with iodoform gauze, and the patient recovered. But I cannot heal the ureter fistula. Still the disinfecting power of iodoform is by these cases clearly established. By no other means could the decomposition of the wound secretion and of the urine flowing through the fistula have been prevented, and death would have been certain.

'Unfortunately my very successful results of total extirpation of the carcinomatous uterus *per vaginam* are very disappointing so far as regards relapse. Even in the 2 cases just described, where I extirpated up to the extreme limits of anatomical possibility, there is already recurrence. Of what use are all our pains and art!' ('*Was nutzt da all' unsre Mühe und Kunst!*')

The question of the extirpation of the cancerous uterus has a very different aspect during pregnancy and in the non-gravid state. For a pregnant woman something must be done to save her life. When not pregnant the question is one of expediency, not of necessity, and it seems probable that there will be very few cases in which a positive diagnosis can be made before the disease has extended so far as to put excision beyond all reasonable hope of success. In the early stages diagnosis is often doubtful, and so serious an operation would not be submitted to if recommended. At a later stage, when a more positive opinion is attainable, and the disease is apparently confined to the cervix, destruction by caustics, or the actual cautery, or cutting or scraping away of the diseased parts, followed by the application of the chloride of zinc or some other corrosive agent, or amputation of the cervix, are all methods of treatment which would have to be considered before proposing total extirpation. And although the results of these proceedings have not been very satisfactory so far as extension or recurrence of the disease is concerned, yet the immediate danger to life is very small compared with that attending removal of the whole uterus. In many cases great relief is obtained for a time, loss of blood and offensive discharges are stopped, pain is lessened, and the general health improved. I have known 2 cases in which, after removal of the diseased cervix and the use of the actual cautery, the patients died about 5 years later on of some other disease, no return of that of the uterus having been observed. But in no other case which has been subjected to the same treatment by me has the relief lasted many months; and of course it can only be expected to be at all useful when the disease is confined to the lower segment of the uterus.

In cases where the fundus or body is affected, if any surgical measures are admissible, excision by the vagina would be the resource to which our present knowledge inclines us. And if it be done sufficiently early by operators who have made themselves masters of all the details of manipulation by practice on the dead body, and by carefully studying the records of the cases hitherto published, we need not despair of establishing for excision of the cancerous uterus, a higher scale of success with fewer failures and more recoveries, and of being able to rescue from their misery as large a proportion of our patients as any surgeons can claim to do when they exercise their art for the removal of cancer from other parts of the body.

I have nothing to add as a result of my own observation or practice to the above sentences published in 1881, and all I can gather from the published reports of others confirms me in the belief that whether a cancerous uterus is excised by the abdomen or the vagina, recurrence of disease is the rule; and it becomes a very serious question if any patient should be advised to take the risk of shortening life—considering that it is about 80 per cent. when the abdominal operation is performed, and from 20 to 30 per cent. after the vaginal operation—when the

gain, even in the most favourable cases, may not be very great, perhaps not even greater than by the less formidable treatment proposed in the preceding paragraph.

PORRO'S OPERATION

The operation now commonly known as Porro's is an extension of the Cæsarean section, and must replace it in most of the cases requiring surgical interference of the kind. It is the result of reasoning and experimental vivisection. The fatality of the Cæsarean section to the mother was only too well known, and its causes were not doubtful. The idea that the danger would be lessened if the uterus itself as well as the contents were taken away, was first suggested by Cavallini, of Florence, in 1768. He proved the possibility of doing so, as well as the fact that the uterus is not necessary to the life and health of animals, by successfully operating on dogs and sheep. Michaëlis of Marburg, in 1809, argued that, as the constitutional effects were less after the gravid uterus had in ignorance been cut away than in cases of Cæsarean section, and as the uterus was an organ worse than useless to a woman who had to submit to any such risk, the question of amputation might be entertained. Blundell and others, a few years later, satisfied themselves that it might be done in the case of animals with a large proportion of recoveries; and Storer of Boston, in 1869, to save a patient from immediate death by hæmorrhage during a Cæsarean section, was forced to cut off the uterus as well as a large fibroid rumour which sprang from it. The woman had been 3 days in labour with a putrid fœtus, and died 68 hours after the operation. This sufficed to show that the operation itself was not directly fatal in the human subject. Porro did the first premeditated uterine amputation in connection with the Cæsarean section in 1876, and saved the lives of both mother and child. With these facts, confirming the justice of the philosophical suggestion, the question of adopting the operation came before the profession for decision. Opinion was divided, but the days of blind opposition were over, and judgment was more calm than when prejudice swayed men to denounce ovariotomy. The practice has since so rapidly and widely spread that Dr. Clement Godson, at the end of 1884, was able to tabulate 152 cases, with 66 recoveries and 86 deaths, reported from 11 different countries and by no fewer than 90 operators. This table of Dr. Godson's is a marvel of exactness and amplitude, and is a useful appendix to the report of a case which he himself conducted to a successful end under very difficult circumstances. The patient was a dwarf, 24 years of age, and Cæsarean section would have been the only means of saving the lives of mother and child if this operation had not been undertaken. It was performed on November 22, 1882. Precisely similar arrangements as for ovariotomy were made. An incision from just below the umbilicus to about 2 inches above the symphysis pubis exposed the uterus. As low down as possible on its anterior wall, or about the junction of the lower with the middle third, a small incision was made just large enough to admit a finger. A gush of venous blood occurred, and the membranes were seen. Dr. Godson inserted the tip of each forefinger and tore the uterus open transversely. The membranes were not ruptured by this manipulation. He thrust his hand through them, extracted the child, tied the cord in two places, and divided it. While he was thus engaged Mr. Thornton, who was assisting him, grasped the neck of the uterus with his left hand and applied the wire of Kœberlé's serre-nœud with the right, so as to include both ovaries and tubes as well as the uterus, at about the level of the internal os. The wire was then tightened, and the uterus with the contained placenta cut away. Solid perchloride of iron was then applied to the raw surface of the stump. Two guarded pins were passed through it above the wire, and a strong silk ligature was passed round beneath them for greater security. The abdominal wall was then closely united around the pedicle, as in ovariotomy. The serre-nœud was not detached till the 13th day. The patient regained perfect health, her abdomen showing hardly any scar, and no depression where the pedicle was secured.

All I need to say now about the way of performing Porro's operation is, that it is not advisable to make an incision sufficiently long to admit of the uterus being turned out entire before opening it. The opening in the uterine wall should be out of the way of the placenta, and Dr. Godson's mode of opening the uterus transversely, just above the

internal os, is probably the best. The child should be extracted in the readiest way possible, and without any attempt to separate the placenta. The operator should firmly grasp the neck of the uterus with his left hand, and carry an elastic ligature round it with his right. Perhaps this might in some cases be advantageously done before the uterus is opened, as soon as any bleeding in the abdominal wound has been stopped, but without making any strong constriction until after the child has been removed. The tying of the cord, and any necessary attentions to the child, should be entrusted to an assistant. The elastic ligature may then be fastened by a simple knot, or by being passed through a leaden ring, which is compressed, or by compression with my forceps. The uterus, with its placenta undisturbed, and the parts inclosed in the ligature, may then be cut away. Of course all the precautions described in the chapters on Ovariotomy and Uterine Tumours, for preventing the escape and exposure of intestines, and for holding the edges of the opening in the abdominal wall together during the manipulation of the uterus and pedicle, should be observed. The uterus having been cut away, and a few sutures passed through the edges of the upper part of the wound in the abdominal wall, supposing the extra-peritoneal treatment of the stump to be preferred, two strong guarded pins are made to transfix the stump from side to side, about $\frac{1}{2}$ an inch above the elastic ligature. If the operator is unwilling to trust to this ligature alone, the wire of Kœberlé's serre-nœud may be passed immediately behind the pins, and as it is tightened, the india-rubber may be cut through, or left as an additional precaution, at the option of the operator. My own belief is that the elastic ligature alone will be quite sufficient. In either case perchloride of iron should be applied freely to the stump, as soon as the peritoneal edges of the opening in the abdominal wall have been sewn closely round the peritoneal coat of the stump. One suture below the stump, and the lowest of those above it, should pass through not only both edges of the abdominal wound, but also the peritoneum of the stump. When these sutures are tightly tied, it is almost impossible for any product of the decomposition of the stump, or any liquefied perchloride of iron, even if applied in excess, to run down beside the stump into the abdominal cavity. The skin and the lower part of the wound should be protected by careful packing with iodoform wool, and the dressings applied as in ovariotomy. Careful daily dressings, changing the iodoform wool, tightening the wire if one is used, removing portions of dead tissue, and the fresh application of perchloride of iron or iodoform, are required until the pedicle separates.

Dr. Godson's table is arranged chronologically. It enables us to trace the quick and universal adoption of the operation, and gives a vivid idea of the changed condition of the profession when we note how general is the diffusion of surgical skill and aptitude equal to dealing with emergencies so pressing and an undertaking so difficult of execution.

The details and references of 152 cases of true Porro's operations are given in the table. It covers the time from the date of Porro's first, on May 21, 1876, to the end of 1884. A calculation of the results shows a mortality of 56·57 per cent. of mothers, and a gain of 124 living children. We learn from the table three lessons: first, that as some form of septic peritonitis was the cause of 56 out of the 86 deaths, it is chiefly to the suppression of this danger that we are to look for a diminution of the mortality among the mothers; secondly, that we ought not to regard the operation as a last resource for dying mothers; thirdly, that, as a major operation of surgery, it compares favourably with some others of the same or even less importance, and that it contrasts very advantageously with the Cæsarean operation.

I have great pleasure in quoting some of the remarks added by Dr. Godson, and in taking the opportunity of congratulating him upon being the first in Great Britain who has succeeded in saving the lives of both mother and child by the operation.

Dr. Godson says, in reference to the number of deaths after the operation, that 'in performing it only as a *dernier ressort* lies one great reason for such a high mortality. Out of the 152 cases you will find 80 only in which the patients' condition was "favourable," in which the pedicle was not dropped in, and in which the success of the operation itself was not prejudiced by any avoidable accident.

Of these 80 cases, 52 recovered, 28 died, a mortality of about 1 in 3. The question of selection should be based on these figures; not upon a summing-up of total results without regard to the circumstances, so far as we can investigate them, which in each case influence the result. It is manifestly unreasonable to include in the same category, as cases undertaken under fair conditions, operations performed when the patient was almost moribund from disease, or exhausted from days of labour, during which the soft parts had been bruised, or lacerations had occurred in the attempts to deliver by means of the forceps or cranioclast.'

And again, speaking of the advantages of Porro's operation: 'Looking at the table, and taking from it the results, the first idea will probably be not altogether favourable, for out of the 152 operations, 86 deaths are recorded against 66 recoveries.

'In comparing these results with those of the old Cæsarean operation, I would call attention to the following astounding facts: In the Vienna Hospital, for 100 years there had not been a recovery after a Cæsarean section; whereas recently, in 3 cases of Porro's operation performed in one week by Professor Carl Braun, the whole of the patients recovered. In Italy, the old Cæsarean operation was almost always fatal. Professor Chiara, of Milan, writes that out of 62 cases operated upon by Porro, Lazzati, Billi and himself, only 3 recovered. On the other hand, nearly half (23 out of 53) of the Porro's operations have been successful, notwithstanding that the operation has been performed by as many as 35 different surgeons. Again, up to May 20, 1879, when Professor Tarnier performed his first Porro's operation at the Maternité in Paris, every Cæsarean case had proved fatal there since 1787. The condition of the patient was most unfavourable, nevertheless she recovered. In our own city, I know that my late colleague, Dr. Greenhalgh, performed Cæsarean section 10 times, with only 1 recovery; while I have myself seen it performed by 4 different operators, every case proving fatal. In Prague, Professor Breisky has performed Porro's operation 4 times; in each case the woman has recovered and the child has been saved.

'The advantages claimed for Porro's operation over the old Cæsarean section are these:

'1. The uterus being removed, and the stump of it being outside, there is no danger of bleeding within the peritoneum, or of exudation of lochia, as before, through the incised uterine wall. At the time of operation, the risk of hæmorrhage is much less, for as soon as the cervix is constricted, it ceases, and this may be very promptly done.

'2. Should bleeding occur from the pedicle, being outside it is under control —an advantage which is, however, sacrificed by the intra-peritoneal method.

'3. The uterus and ovaries having been removed, the dangers arising from a subsequent pregnancy are avoided.'

In the above summary by Dr. Godson of the advantages claimed for Porro's operation, it is assumed that the uterine stump is fixed outside—that the superiority of the extra over the intra-peritoneal method is established—and it is quite true that an examination of the cases tabulated by Dr. Godson tend to confirm this conclusion. Only 14 cases were treated intra-peritoneally, and of them only 5 recovered, while of the extra-peritoneal cases there were 59 recoveries to 79 deaths. But, in my opinion, it is not at all improbable that further trials of the intra-peritoneal method, by elastic ligature and peritoneal suture, may modify this conclusion, or even reverse it. Whether the necessary experimental trials of both methods are in this country to be made upon women only, or upon females of some of the lower animals, must depend upon the manner in which British physiologists are limited in their researches by the officials who administer the Act of Parliament 34 & 35 Vict. c. 98 (1876), known as the 'Vivisection Act.'

CHAPTER III

EXTIRPATION OF THE SPLEEN

One of the main characteristics of modern surgery is its boldness and success in dealing with the organs of organic life. Although in former times the three great cavities were punctured, excision of the organs therein was scarcely thought of as a means of saving life. The Cæsarean operation was done with more regard to the rescue of the child than that of the mother. The current phrases, 'cutting for the stone,' 'tapping,' 'trephining,' mark the limitations of the efforts of ancient art. Relieving pressure, letting out fluids, and getting rid of a foreign body were the ends accomplished. Tumours of the brain and gangrenous lungs brought about death without any attempt to avert it, and the abdomen was a sort of Alsatia for every organ it sheltered. But the day that McDowell ventured into the peritoneal cavity for an ovarian tumour was the last of its immunity. He, indeed, little thought to what his act would lead; and I believe, if the truth were told, the generation of surgeons now working out the sequel of his daring are not a little astonished at the lengths to which it has inspired them to go. A short summary of what has been done in abdominal surgery for the extirpation of diseased organs, or parts of organs, I propose for the following chapters, as we may fairly trace the whole extension up to the starting-point of the peritoneal invasion by ovariotomy.

I have enlarged upon tumours of the uterus and its appendages, and have shown that even evisceration, as far as regards these parts, is a justifiable and life-saving proceeding. Sir Henry Thompson has written upon the new surgery of the bladder, and other operators have proved how successfully they are able to rectify the occasional injuries to that organ and to the ureters.

But in order of time, the spleen was the first abdominal viscus that was brought under notice as capable of being dealt with like an ovarian tumour. I think we may look upon the case of extirpation of the spleen attributed to Zaccarelli, in 1549, as apocryphal. We do not find anything authentic till 1826, in which year Quittenbaum, of Rostock, removed a diseased spleen from a woman, who died of shock in 6 hours. Then, in 1855, Küchler, of Darmstadt, reported that he had done the operation on a man who had enlarged spleen from ague. He encountered no special difficulty in his undertaking, but lost the patient from hæmorrhage 2 hours after operation.

My attention was first drawn to the subject by a specimen of enlarged spleen exhibited at a meeting of the Pathological Society in 1862, by Mr. Nunn.

At that time I did not know that the operation of extirpation had been performed on the human subject. I believed that it had not been attempted in Great Britain. But in reasoning about the matter, I could not doubt the possibility of safely accomplishing in man that which presented no fatal difficulty in dogs. I saw that, in such cases as Mr. Nunn's, it was the enlarged spleen which directly killed the patient, in spite of all remedies; and so, putting together the facts of the fatality of the disease, the proved possibilities of living without the organ in question, and of getting rid of it by operation, the conclusion could not be evaded that a surgeon who, after due preparation, refused the responsibility of such an extirpation was failing in his duty. Recent experience in ovariotomy lent force to the conviction that it was a thing to be done, and a carful study of the elaborate treatise, 'Die Extirpation der Milz am Menschen,' by Simon, of Rostock, confirmed my resolution to make the attempt. I had to wait for the occasion, but in the autumn of 1863 I was consulted by a lady who had a spleen enlarged to 3 or 4 times its natural size. There had been no attack of ague. The face was very pallid, and there was a considerable excess of white corpuscles in the blood. The spleen rapidly enlarged. Sir W. Jenner and Sir Ranald Martin consulted with me in the spring of 1864, but the state of the blood set aside any serious consideration of the question of operation. The patient died in March 1865, and Mr. Mitchell Clarke, of Clifton, examined the body at my request, with the express

object of ascertaining what would have been the mechanical difficulties encountered if the large spleen had been removed. He reported that 'it was very easily drawn through a long incision in the linea alba, and the vessels having been tied in 3 or 4 bundles, it was detached. There was not the slightest adhesion to any organ, nor to any other part.' Then came other patients who were not so seriously affected by the tumour as to make a dangerous operation advisable.

At length a woman, 34 years of age, who had been married at the age of 19, placed herself under my care, evidently dying from a large spleen, without, so far as I could discern, any other disease. She had 3 children, the youngest of whom was born 11 years before. She had never miscarried. The catamenia had been regular. Though weak and of a frail family, she had been as well as usual till the latter part of 1864, when she began to flag, but it was not till April 1865 that any swelling in the abdomen was noticed. It was first observed beneath the left false ribs, and grew downwards and to the right. At my first visit, in October 1865, I found the spleen extending as high as the 7th rib, and so low in the pelvis that it could be felt by the vagina in front of the uterus. The notch was distinctly perceptible a little above the umbilicus. On the right side, below the umbilicus, it extended within 3 inches of the anterior superior spine of the ilium. On the left side the posterior border was felt free and well defined in the loin. It was impossible to ascertain by palpation or percussion where the enlarged spleen and left lobe of the liver met, nor could any enlargement of the liver be detected. Some dilated superficial veins ran over the tumour and left side of the thorax to the left axilla. There was no œdema of the legs, nor any sign of dropsical effusion nor glandular enlargement. The complexion was rather pallid, but the lips, gums, and conjunctivæ were of a good colour—indeed rather florid. She had been confined to her bed for nearly a month, owing to the pain in the abdomen and general uneasiness; but the appetite was tolerably good. There was a tendency to constipation. I explained the nature of the disease to the husband, and said that nothing but an operation—which had never been done in England, and only twice abroad, unsuccessfully—offered a hope of saving life. I saw her at intervals until November 14. During three weeks she had been trying to take quinine, iron, and bromide of potassium. The quinine produced headache. The catamenia had appeared twice within the last month. Her nights had been more disturbed by pain; she had a little cough, but air entered both lungs freely. The heart was pushed a little upwards and to the right. The urine was acid, deposited urates, and was free from albumen. The spleen was now rapidly increasing in size. In consultation Sir W. Jenner observed a soft anæmic cardiac murmur, and a small tumour just above the umbilicus, to the right of the notch in the spleen, which we supposed to be either a splenculus or a part of the pancreas. The blood was carefully examined and a slight excess of white corpuscles was noted, but not greater than is often observed in pale persons.

Sir W. Jenner expressed his opinion that the patient could not live long if left to medical treatment only, but that excision of the spleen did give '*the shadow of a chance*' of saving life. The patient and her husband considered the matter, and I performed the operation, by their desire, on November 20. Mr. Clover administered chloroform, and I was assisted by Drs. Bowen, Ritchie, and Wright. I made an incision which extended 5 inches above and 2 below the umbilicus, along the outer border of the left rectus. Two arteries were tied before the peritoneum was opened. In opening the peritoneum rather a large artery was cut across in a piece of omentum which was loosely adherent between the surface of the spleen and the abdominal wall. The vessel was tied. The adhering portion of omentum was separated, and by putting in my hand and turning the lower edge of the spleen first through the opening, the whole of it was easily removed. The intestines were prevented from escaping by Dr. Wright, who kept the edges of the opening carefully together behind the spleen, which was held only by the vessels and the gastro-splenic omentum. I was beginning to twist the spleen round to bring the vessels into a sort of cord, preparatory to applying a ligature, when the splenic vein, which was as large as a small finger, gave way, and blood ran freely from the spleen; but none was allowed to enter the abdomen, and I at once inclosed the vessels in a large clamp

and cut away the spleen. Before tying the vessels, temporarily secured by the clamp, I passed eight silk sutures to keep the edges of the incision well together. The peritoneum was thus protected and the viscera retained while I was dealing with the vessels. These were tied in 2 bundles above the clamp, which was then loosened, and 2 arteries and a vein were also separately tied before it was finally removed. On taking it off I found that part of one end of the pancreas, as large as the end of a thumb, had been bruised by it. All the ligatures, except those on vessels in the abdominal walls, were cut off close and returned with the included tissues. The sutures were then tied, and the abdomen was well supported by plaster, pads of lint, and a bandage. The patient was 35 minutes under chloroform, had shown less evidence of shock than was often seen during ovariotomy, and her pulse throughout was between 80 and 90.

The spleen is now in the Museum of the College of Surgeons. It weighed, on removal, 6 pounds 5 ounces, but 9 ounces of blood drained out of it, leaving the weight 5 pounds 12 ounces. It measured 11 inches in length, 8 in breadth, and between 3 and 4 in thickness.

Reaction was slow. There was not much pain, but the stomach was irritable and the kidneys secreted abundantly. Twelve hours after the operation the pulse rose to 100, and the patient became restless. There was some vomiting, no tympanites, and flatus passed readily both by mouth and rectum. The skin continued warm and moist, and there was plenty of urine without albumen. The patient was fed by the rectum, but at times retained in the stomach some milk and soda-water.

On the morning of the 2nd day there was a violent spasm of the diaphragm. The pulse rose to 112, with hot, dry skin, chest oppression, and some abdominal pain. This was relieved by opium, given internally, and there was quiet sleep for a few hours till 3.30 of the 3rd day, only waking up occasionally. At that time there was a violent rigor, commencing suddenly with a feeling of cold in the back. The rigor only lasted for a few minutes, but reaction did not take place for half an hour, and was followed by profuse perspiration. During the day the patient was able to take milk and soda-water, but at 4 o'clock in the afternoon a second rigor, in every respect similar to the former one, took place. The rest of the evening the pulse remained at 120 to 130, and the urine continued to be secreted in large quantities, notwithstanding the violent perspiration.

On the morning of the 4th day 6 grains of quinine were given before the expected attack. There was no rigor and the patient slept well. The pulse was only 96. During the day, egg beaten up and mixed with milk was given and relished. In the afternoon I removed the stitches, and found the wound was perfectly united. Some more quinine was given, but as it produced buzzing in the head, it was discontinued.

During the 5th day the patient was remarkably well. She was able to enjoy the milk and rusk. Pulse continued about 108, rising at night to 120. Some fluid fæces were passed. The patient also continued well during the 6th day. Urine in abundance was secreted, and the bowels acted naturally in the morning. Milk given freely. In the afternoon the bowels began to be irritable, and port-wine with 10 drops of laudanum was injected into the rectum. A good deal of flatus passed. At night she was very cheerful and comfortable, and there was some colour in the cheeks. About 10 o'clock she was fed moderately and slept; but about 1 in the morning of the 7th day she awoke, complained of cold and of a pain in the back, which she had felt at each of the previous rigors. The bowels acted very freely. The pulse was very feeble, and rose to 150, and the respiration to 44. She rapidly became weaker, and died about 4 hours after the sudden change—158 hours after the operation.

We examined the body 12 hours after death. Decomposition had advanced with unusual rapidity. Fluid blood and air bubbled from the superficial veins as they were opened. The wound was perfectly united, but the cutaneous edges were separated without difficulty. The peritoneal edges adhered much more firmly. Two ligatures on superficial vessels came away with a very slight pull. A few drops of pus were observed in the track of one of the ligatures. There were no signs of general peritonitis; scarcely any serum, and not a trace of blood being found in the abdomen. Redness and effusion of lymph were entirely limited to the seat of operation. The ligatures on

the blood-vessels were found with difficulty, being overlapped by the pancreas, which was large. The liver also was large. The kidneys were healthy. Both pleural cavities and the cavity of the pericardium contained a large quantity of dark red serum. The lungs were healthy, although there were old pleural adhesions at each apex. The heart was large and flabby, and contained soft clots, which extended along the pulmonary artery to the second divisions. These were the only clots found in the body, the blood elsewhere being thin and fluid, and air bubbling out wherever a vein was opened.

I did not remove another spleen until 1873. The patient was a married lady, 42 years of age, who had observed a small tumour nearly 20 years before. It had not affected the general health, and she was in no way incommoded, till 1870, when more rapid enlargement took place. Even then she chiefly complained of lassitude and weakness of the legs. But in September 1872, when I was first consulted, her condition was such as to bring forward the question of operation, as it was clearly a case of enlargement of the spleen. By May 1873 all repugnance to the proposition had given way, and the patient was desirous to run even a serious risk of losing her life, rather than go on in her then miserable state. The catamenia had been irregular for some time, but had recently reappeared. No notes were furnished to me as to any blood examinations, but there was no history of malarial influence.

I went to Birmingham to do the operation on May 24, and was assisted by Mr. Goodall, Mr. Bartlett, and Mr. G. H. Evans. Dr. Day administered methylene; and there were present Dr. Tracy of Melbourne, Dr. Maxwell of Formosa, China, and Dr. Chadwick of Boston, U.S.

I have little to say about the operation, which only differed from that in the first case in the incision being along the linea alba instead of to the left, and that I tied the splenic artery nearer to the aorta. The tumour was nearly double the size of the first, weighing 16 pounds 3 ounces soon after removal, and 12 pounds after all the blood had drained from it.

There was much sickness and restlessness after the operation, but some hours of sleep during the night, with the skin freely acting. Next day the perspiration was profuse; sickness continued, but there was no restlessness. The vomit on the 2nd day 'assumed a coffee-ground character,' and the abdomen was tympanitic, with some cessation of sickness. The dark vomit reappeared, and on the 3rd day the pulse quickened, and she began to sink, dying about 70 hours after the operation. These symptoms evidently indicate septicæmia. They were much more frequently observed before the adoption of the antiseptic precautions now so much more strictly enforced than in 1873. I have little doubt this patient would have been far more likely to have recovered if the operation had been done with all the safeguards that would now be used.

No post-mortem examination was permitted. Mr. Richards, of the General Hospital, Birmingham, examined the tumour and made drawings. Tumour and drawings were sent to the Museum of the College of Surgeons, and the following is the report which I received from Mr. Richards:

'The enlarged spleen, of which the size and colour are accurately represented in the painting, weighs 12 pounds, and is of the consistency of healthy human liver. The surface is smooth. The finger, passed over the surface, is found to ride over hard nodules which are pretty uniform in size, each nodule being about the size of a cob-nut. One of these nodules, together with a small amount of intervening tissue, is enucleated for minute examination.

'The internodular tissue presents the character of ordinary splenic pulp. The nodule has neither capsule nor limiting membrane, nor large vessels going to it. It is almost as firm and tough as cartilage. On section, the central portion is yellow-like tissue undergoing caseation; the periphery is purple, like splenic pulp. The two blend insensibly. Fresh scrapings show splenic cells, with many large cells the size of human liver cells, containing a little granular matter and one small eccentric nucleus. The cells are nearly uniform in size and shape, and nearly spherical.

'Microscopical sections of the nodule show it to be composed of splenic cells, with abundant irregular stroma; here and there are racemose alveoli, containing the large before-named cells. The large cells are in greatest abundance at the centre of the nodule. I am satisfied that the affection of the organ is not cancerous, nor

sarcomatous, nor any form of amyloid disease.'

The 3rd and last time of my removing an enlarged spleen was in June 1876. The patient was a married woman, 27 years of age, sent to me in the previous February by Mr. Jenkins, of Oxford, who in the August of 1875 thought he heard the fœtal heart sounds, but as they were not distinguished afterwards, he advised her to see me. She was then about the size of a woman near the end of pregnancy. No fluctuation could be detected in the tumour, and after a too hasty examination, I said it was a case where tapping would be useless, and advised removal of the tumour as soon as she was willing to submit to operation. I did not see her between February and June. In June the tumour was somewhat, but not much, larger than in February, filling the whole of the lower part of the abdomen, extending upwards under the left false ribs, but on the right side only half way between the umbilicus and the right false ribs—not reaching quite across to the right superior spinous process of the ilium. The os and cervix uteri were normal; the tumour could be felt by the vagina, and when pressed up on the right side moved the cervix. The movements of the tumour were not much influenced by respiration. No distinct fluctuation could be detected, but in some directions it was doubtful. Lumbar sounds were clear on percussion on the right side, dull on the left. A depression, suggestive of the splenic notch, was felt about 3 inches to the right of the umbilicus. She was a healthy-looking woman, of clear complexion, and not emaciated. The catamenia were regular, neither excessive nor deficient. I have not much to say about the operation, except that Dr. Marion Sims was present, and that the tumour weighed 11 pounds, or $7\frac{3}{4}$ pounds after $3\frac{1}{4}$ pounds of blood had drained out of it. This was the only one of my 3 cases in which loss of blood was the cause of death. The reason why the bleeding escaped my notice at the time of operation is explained by the account of the post-mortem examination; and the obvious lesson of the case is, that the splenic artery should be tied before it divides into its branches, and as near the aorta as it can be done, without cutting off blood supply to the pancreas and left side of the stomach. Probably Franzolini's method of tying both artery and vein separately, with two silk ligatures, and dividing the vessels between the ligatures will prove to be the best.

Eight hours after death the body appeared perfectly white and bloodless, and so did the muscles of the abdominal wall when cut into. After taking out the sutures the incision was extended upwards nearly to the ensiform cartilage, and a short incision carried outwards on the left side, just above the umbilicus, so that a good view of the parts might be obtained without in any way disturbing them.

The intestines and stomach looked perfectly white, and the latter was much distended with gas. No blood nor clot to be seen. The stomach was turned up and held on one side so that the ligatures could be seen, and they were found to be holding firmly. The one which was applied by transfixion, and tied in two halves, included in each half a large branch or division of the splenic artery and the corresponding veins. The one which was applied separately, afterwards, included nothing but some loose cellular tissue, found to be a part of the gastrosplenic omentum. Close to this was a piece of the spleen, about the size of a walnut, also held merely by loose cellular tissue. A considerable quantity of bright red fluid blood was sponged out, and at least a pound of dark coagulum was then removed, and a large dark mass brought into view, which proved to be a quantity of coagulum, inclosed in a bag formed by the connections of the pancreas, duodenum, and parts included in the first two ligatures. On incising this and removing the clot—of which there was as much as 6 to 8 ounces—the points from which the main hæmorrhage had occurred were found. They appeared to be some of the smaller divisions of the splenic artery, including the vasa brevia and a small branch passing to the pancreas.

The chief hæmorrhage had therefore occurred from divisions of the artery, the main branches of which were included in the first two ligatures; but the trunk, before bifurcation, had not been secured. The posterior part of the peritoneal cavity contained some clot and fluid blood, and the pelvis was full of fluid, which appeared chiefly blood. The whole of the hæmorrhage had taken place originally into the sac named above, formed by the connections of the pancreas, duodenum,

and spleen, and when this would hold no more, the blood had escaped from an opening in it posteriorly. Hence, until the parts were turned aside, there was no appearance of the extensive hæmorrhage which had taken place.

I have only seen one case of a splenic cyst, and that was in a lady whom I attended several years ago with Sir W. Jenner. The diagnosis was very doubtful, owing to the presence of gas, as well as fluid, in the cyst before I tapped it. The contents were chiefly decomposed blood, with very fetid gas; but by drainage and daily injections of iodised water for more than a month, the patient quite recovered and remained for several years in good health. I have seen 2 other cases of enlarged spleen where operation was contemplated; one with Dr. Wilson Fox, where the spleen gradually diminished under the influence of reduced iron; and another, a young lady from Trinidad, for whom I made an exploratory incision in June 1883, but did no more than clear the peritoneum of ascitic fluid, as the spleen was not very large, was intimately connected with the pancreas and the liver, and there was a very clear history of considerable variations in its size. She went to Dieppe, and I heard some months afterwards that the splenic tumour could scarcely be detected. I heard lately that she married in 1884, and is now well.

I gather from the interesting monograph on Splenectomy, by Franzolini, of Udine, published in 1882, that, from the first case by Quittenbaum, in 1836, up to Franzolini's own case in 1881, 28 cases of extirpation of the spleen in the human subject had been recorded. Twenty-two of these were in women, 4 in men, and 2 doubtful. One was a simple, and one an hydatid cyst of the spleen. Four cases are described as movable spleen; all the others as simple, malarial, or leukæmic hypertrophy. Only 5 of the patients recovered—the 1st, a cyst; the 2nd, a simple hypertrophy, the tumour weighing less than 3 pounds; the 3rd, a movable spleen, the size a little more than normal; the 4th, also movable, measuring 23 centimetres in length, 12 in breadth, and 6 in thickness; the 5th, Franzolini's own case, where the weight was scarcely over 3 pounds. The tumours in my own cases appear to be the largest yet removed. Nearly all the deaths seem to have been from hæmorrhage and collapse. Credé has collected 30 cases up to 1881, most of them the same as Franzolini's. Of these 16 were leukæmic, and all died; of the remaining 14, 5 died and 9 recovered; of the 9 recoveries, in 1 the spleen itself was normal and free in a peritoneal abscess, in 4 the spleen was simply hypertrophied, in 2 movable, or what is termed 'wandering spleen,' and 2 were splenic cysts.

These facts, and the two operations which I performed after my first, do not lead to any important modification of the following remarks, made in commenting on my first case, and published in the 'Medical Times and Gazette,' vol. i. 1864:

'The cases of Quittenbaum and Küchler had taught that a large spleen could be easily removed; but as 1 patient only lived 2 hours and the other only 6 hours, it was doubtful whether a human being would recover from the immediate effects of the operation. The case now recorded does at least make this addition to our knowledge.

'It also proves that neither hæmorrhage nor peritonitis necessarily follows the operation. Some alteration in the blood, which becomes fluid, and permits of a rapid exudation of serum into the pleural or other serous cavities, may perhaps prove in other cases, as in this, to be the chief danger to be dreaded.

'The principal difference between the operative proceedings of Quittenbaum and Küchler and my own was in the removal of the ends of the ligatures which secured the splenic blood-vessels. In their cases the ends of the ligatures were left and brought out through the wound. I had found a similar mode of dealing with the ligatures which secure the pedicle in ovariotomy to be so very unsuccessful—the threads acting as setons and setting up peritonitis—that I determined (if the clamp made much pull upon the stomach) to cut off the ends of the ligatures and return them with the included tissues—a proceeding which has led to very good results in ovariotomy. In dogs, two or three turns of the spleen, twisting the blood-vessels, are often enough to stop bleeding without any ligature; but although this may answer with a spleen of natural size in a dog, it could not be thought of, except as a preparative for the ligature, in the case of a large spleen in man. But my trial shows that it would be better not to attempt it, for the splenic

vein burst before one turn was completed. If I were to operate again, I would tie the vessels in separate bundles as they enter the spleen, and then cut away the organ.

'The parallel between the operation for the removal of an enlarged spleen and an enlarged ovary ends with the operation itself. The successful removal of one ovary is frequently followed by the most perfect health of the woman, who may bear children of both sexes. Whether a human being would enjoy good health without a spleen is a question still waiting for a satisfactory answer. Experiments on other animals may be objected to, although the impunity with which the organ may be removed and the good health of the animal for years after does seem to imply that the offices it performs cannot be of very great importance, and may be performed by the lymphatic glands or some other organs. Dr. Wilks says that the spleen may be "shrunken into so small a compass, and surrounded by so thickened a capsule, that its enlargement seems impossible, and its appearance would suggest that the functions of such a withered organ had altogether ceased. Yet, if so, there are no symptoms to indicate its loss." ("Guy's Hospital Reports," Third Series, vol. xi. p. 41.)

'Many cases have been recorded which prove that after partial or total removal of the spleen by accident life may be prolonged, but there is little satisfactory information as to the length of life or state of health of the individuals.

'In one remarkable case a woman, 30 years of age, who had fever in January 1711, had swelling and pain in the left side of the abdomen, followed by swelling of the left foot and leg, and in February by a fetid discharge from the uterus. For the next four months she became thinner, and fluctuation was detected in the abdominal swelling. Ferrerius then made a puncture 3 fingers' breadth below the umbilicus to the left side, from which a discharge of fetid pus was kept up for many days. A second and larger opening higher up, near the umbilicus, then occurred spontaneously, and the matter was discharged through both. The patient became much emaciated, when the surgeon saw a bluish body at the upper opening and removed it without much trouble. It was 8 fingers in length, 2 in thickness, and the same in breadth. It was examined by Fantoni, and found to be the spleen. The patient began to improve at once, but for several days a portion of her food passed through the opening near the umbilicus, as if the abscess about the spleen had been complicated by a gastric or intestinal fistula. But the wound healed, the patient recovered her strength, had a good colour, the catamenia returned regularly, she became pregnant, and bore a healthy child; but from this time the abdomen began to swell again, and during a year different parts of the body, especially the head, were attacked.

'This is one of the most complete accounts we have as to the state of health after loss of the spleen. It is quoted by Hecker and Simon from Fantoni's "Opuscula Medica," published at Geneva in 1738. Cases in which, after penetrating wounds of the abdomen, the whole of the spleen or portions of it have been removed are on record, but I have only been able to meet with two well-authenticated cases where the *whole* spleen was removed. The first was in 1678 by Mathia; it is related by Crüger and quoted by Simon. A watchman, 23 years old, was stabbed. The spleen protruded. The vessels were tied and the spleen cut away 3 days afterwards. There was free bleeding, but it was stopped by a styptic powder, and the man was well in 3 weeks. The divided vessels formed a lump of the size of a hazel-nut, and adhered to the cicatrix. The man returned to his duties, and was seen in good health $6\frac{1}{2}$ years after the accident.

'The second case occurred in 1815, and is recorded by Lenhossek (Hecker's "Annalen," Berlin, 1828). A youth of 19 was wounded in the abdomen. The spleen protruded, and, as it was becoming gangrenous, it was cut away after tying the vessels. The wound healed, and in 1818 the man was quite well.

'Cases of partial excision of the spleen are much more numerous, but I shall only refer to one recorded by Berthet, in 1844, where a man lived and enjoyed good health for 13 years after a wound followed by hernia and extirpation of a large portion of the spleen. He died of acute pneumonia, and after death only a small piece of spleen was found, the size of a hazel-nut, which was adhering to the stomach. The case is quoted by Gray and Simon from the "Archives Générales de Médecine," 1844. These cases of partial excision are of far less physiological importance than cases of total excision; for Dr. Crisp

has shown that if a portion of the spleen be left it may grow, and the organ may be more or less completely reproduced. This, Dr. Wilks observes, is "quite in harmony with the simple hypertrophy of the spleen, for if an organ of a given size can grow to several times its normal standard, there appears no reason why a small portion remaining after an operation should not again grow to the original dimensions" (*Op. cit.* p. 40). This remark prepared me to leave a portion of the spleen in my patient, if I found it possible to do so, or the splenculus, if, as we thought probable, it had existed. Possibly it might be advisable to act on this principle in a case where it could be done safely.

'If it be asked, "In what cases may an enlarged spleen be excised?" the conclusion would seem to be that they can be only very few. If a large spleen were wounded, or ruptured, or caused obstruction of intestine, the operation might be the only means of saving life. But in the absence of some such accident immediately endangering life, it is not often that a patient *has* a large spleen and has *not* some co-existing disease of liver, kidneys, or lymphatic glands, which would either prevent the success of the operation, or would destroy the patient soon after the recovery from its immediate effects. Where no such disease co-exists, then probably the ill effects of the large spleen are either too slight to warrant a dangerous operation, or the general condition of the patient is too bad to give any reasonable prospect of recovery. This is especially true with regard to that form of enlarged spleen which follows ague. Either it is amenable to treatment, or, if the patient be ill enough to induce the surgeon to think of an operation, the general health is so broken up and the blood is so altered, that a simple cut or ulcer may lead to dangerous bleeding, and *à fortiori* a serious operation would most likely be fatal. The relation which the enlarged spleen after ague bears to the accompanying leukæmia, hydræmia, or melanæmia, is a problem which has still to be solved; and, even in the leukæmia which occurs independently of ague, it is still a matter of doubt whether the enlargement of the spleen or the alteration in the blood bears always the same relation of cause and effect. But as it has been proved experimentally that the blood which issues from the spleen by the splenic vein does contain a much greater number of white corpuscles than the blood in the general circulation, and it is known that in simple hypertrophy of the spleen there is a great increase in the proportion of white to red corpuscles in the blood throughout the body, it would seem to be a fair presumption that removal of the spleen by cutting off the supply of the white corpuscles which are in excess, might save the life of persons who would otherwise die of leukæmia.'

In 1882, Dr. B. Credé brought a case of extirpation of the spleen before the German Surgical Congress at Berlin, and published a valuable paper on the subject in 'Langenbeck's Archiv' in 1883. He removed in September 1881, from a man 44 years old, a spleen which weighed about 15 ounces, after about 56 ounces of fluid had been withdrawn from a cyst. He tied all the vessels separately with catgut, cutting off the ends close to the knots. The patient recovered, and 10 months after the operation was in good health, working as a mason. His conclusions, after a careful study of the whole subject, agree very nearly with my own in 1864 repeated above, but with additions to the effect that in the animal organism the spleen serves for the transformation of the white corpuscles of the blood into red, and that adults are not injured by loss of the spleen, although its removal may cause transitory disturbance in the formation of the blood, and swelling of the thyroid gland which may, for a time, supply the functions of the spleen.

The discussions here, which followed the cases of Mr. Hayward in 1882, and of Mr. Spanton in 1883, led to the conclusion that, in cases of leucocythæmia, the enlarged spleen should certainly not be removed until after the free use of reduced or dialysed iron; and that the best results are to be hoped for in cases of simple or malarial hypertrophy. The alternative proposal of tying the splenic artery cannot be tried on the human subject until sufficient experiments on the lower animal have been made.

CHAPTER IV

THE OPERATIVE SURGERY OF THE KIDNEY

NEPHRORAPHY; TAPPING AND DRAINAGE; NEPHROTOMY; NEPHROLITHOTOMY; NEPHRECTOMY

Students who have followed the extension of the domain of peritoneal surgery, from the revival of ovariotomy to the removal of uterine and splenic tumours, however great their expectations as to further progress, must still be surprised at the very rapid development, within the last few years, of the surgery of the kidney, even more than that of other departments of abdominal surgery. Twenty years ago tapping a renal cyst was a novelty. An abscess occasionally made way for the passage of a renal calculus; very rarely a tumour, supposed to be ovarian or uterine, was found to be renal after an operation had been begun, and the operation was either left incomplete or the kidney was removed with the tumour, after tying the renal vessels, as the only mode of stopping bleeding; or the fact of the removal of the kidney was not discovered until after the completion of the operation. On the last contingency a useful purpose was served, as experiments on the lower animals proving that one kidney might be removed without serious ill consequences, and that the remaining kidney fulfilled all the necessary excretory functions, were confirmed by the condition of the patients who had been subjected to such an unintended operation. One such case occurred to me 18 years ago. It has been included in Mr. Barker's, and in other tables; and all I need say of the case now is, that, although the patient died of septicæmia, the removal of the kidney did not appear to have had any special influence on the progress of the case. There was nothing in the urine after operation unusual after ovariotomy. This was very carefully examined, as the whole of the left kidney and the ureter were known to have been removed, together with a solid tumour which weighed 7½ pounds, and a cyst which had contained 16 pints of fluid.

Many years before this case, in 1848, I opened a perirenal abscess in the loin of a sailor in H.M.S. 'Trafalgar,' and finding a renal calculus on probing the abscess, easily removed it; and another a few days afterwards. In 1854, I exhibited at the Pathological Society a calculus found by Dr. Bence Jones to consist of uric acid, which I had removed after opening an abscess by the side of the rectum of a gentleman. It had no doubt been arrested just where the ureter passes through the coats of the bladder, as there was free escape of urine for some days after its removal, though this gradually ceased, and there was no further trouble. Twice since I have removed a renal calculus from the loin after opening an abscess.

Fifteen years ago another case taught us to what a large size tumours of the kidney, or closely connected with it, may attain. It was also illustrative of the difficulties surrounding the question as to the point of origin. A single woman, aged 35, was admitted into the Samaritan Hospital in December 1870, with the abdomen greatly enlarged. There was extreme œdema of the abdominal walls. Fluctuation was scarcely perceptible, and only doubtful in the lower part of the abdomen; there was no crepitus, and the sounds on percussion were dull all over the swelling. The uterus appeared to be small, normal in size, and movable. No tumour could be felt in the pelvis. She had gradually attained her very great size since the spring of 1870. The tumefaction of the abdominal walls was too great to admit of any satisfactory diagnosis as to the nature of the tumour. This could be only ascertained by an exploratory incision, which was accordingly made between the umbilicus and symphysis pubis to the extent of 6 inches. Much serous fluid escaped, and 3 or 4 superficial vessels were tied. Four or 5 pints of clear serum flowed out when the peritoneal cavity was opened, and a solid tumour was exposed, very firmly adherent and vascular on its surface. One large vein at the upper part bled so freely that, after vainly trying to apply ligatures (for the soft granular tissue gave way before the silk), I used the actual cautery and solid perchloride of iron. The wound was closed with sutures and long bands of strapping. It did not unite well, and

after 2 or 3 weeks it opened, and allowed the tumour to protrude a little. There was continued drainage of serum from the gaping incision, and from punctures made at various times in the legs and thighs, which relieved the urgent dyspnœa and prolonged life; but the patient gradually got weaker, and died 8 weeks after the operation.

The tumour was found adherent to the abdominal walls, to the liver, omentum, and descending colon. Behind, it was inseparably connected with the right kidney, which had to be removed with it. The tumour alone weighed 84 pounds. The uterus and both ovaries were healthy. Dr. Wilson Fox reported that the tumour was 'fibro-plastic,' that the right kidney could only be separated from it by careful dissection, and that it probably originated in the kidney, or in the peritoneum covering it. Portions of the tumour are preserved in the Museum of University College.

In going over tables of operations on the kidney, it is interesting to remark that, while 20 years ago a large proportion of the operations were performed after an error in diagnosis, during the last few years a very correct diagnosis before operation has been the rule, and a mistake an exception.

In 1877 I was led into error in a patient who was admitted into the Samaritan Hospital, supposed to be the subject of an ovarian cyst, with a history of 3 tappings within the preceding 5 years, of 44, 46, and 52 pints of fluid, by surgeons who had no doubt about the fluid being ovarian. After incision and removing 31 pints of fluid, and more than a pound of cyst wall, it was found impossible to get away the rest of the cyst. A drainage-tube was inserted, and the patient died on the 5th day. The cyst was clearly one of the left kidney, the main cavity being formed by one of the calyces.

Among the affections of the kidney which most frequently come under our notice, I may mention painful, movable, or floating kidney, hydronephrosis, pyonephrosis, formation of stone in the kidney, cystic degeneration, growth of hydatids, tumours either in the substance of the kidney or closely attached to it. For information on the questions of diagnosis which come up in connection with these cases, I may refer to the chapter on Differential Diagnosis in Part I.

MOVABLE OR FLOATING KIDNEY

forms an abdominal tumour occasionally tender on pressure, and painful itself, but more frequently neither tender nor painful, and only causing uneasiness in patients or anxiety in their medical attendants, because of the uncertainty as to the precise nature of the tumour and the possible future consequences. When assured that the tumour is nothing more than a kidney which is too movable, and that nothing more need be recommended than an abdominal belt, most patients are perfectly satisfied. Occasionally the kidney is somewhat enlarged and tender, but this is mostly the effect of unnecessary handling, and disappears with rest and quietness. Sometimes a mass of hard fæces in the colon curiously resembles a movable kidney, which may also be simulated by a cancerous growth involving some part of the intestines. But I have seen a great many cases where I have excluded these and other sources of fallacy, and have convinced myself that one or both kidneys were abnormally mobile. In women, I have almost always found that it was the right kidney. I attended a lady with Dr. Wilson Fox, seeing her from time to time for several years, on account of a tumour which we both believed to be a movable right kidney. It could be pushed into the loin, and across the abdomen as far as the umbilicus, and in size and shape exactly resembled the kidney. At length she began to suffer from an enlargement of the left ovary. This attained a considerable size, and I removed it. Taking the opportunity of examining the supposed movable kidney, I found it was the right ovary, lying just above the right kidney, with a slender pedicle at least a foot long. In size, shape, and consistence it resembled a kidney, and I removed it. The patient recovered, and is still quite well. In other cases of supposed movable kidney, I have found that the tumours were pedunculated outgrowths from the uterus, but I have no doubt whatever that movable kidneys are not unfrequently met with. I have never myself known them cause sufficient inconvenience even to raise the question of operative interference. But there are many cases on record where they have led to nephrectomy, or to the operation of fixation, recently styled 'nephroraphy.' Never having yet seen

the necessity of either removing or fixing a movable kidney which was not enlarged, I must be content with referring those who are interested in the subject to an interesting paper by Professor Ceccherelli, of Parma, published in the 'Rivista Clinica' of April 1884, entitled 'La Nefrorafia nel Rene Mobile.'

TAPPING OF RENAL CYSTS

I have only 3 times tapped renal cysts. These cases were remarkable, and some account of them follows:

Pyonephrosis of the right kidney, with impaction of two calculi in the ureter.—On May 16, 1865, I was called to see the mother of a patient upon whom I had performed ovariotomy successfully, the daughter telling me that her mother had a tumour like that which I had removed from herself. I found the patient in pain all over the abdomen, but greater on the right side and in the right loin; and I felt a hard tumour between the right false ribs and the right ilium, reaching forward to within an inch or two of the umbilicus.

The patient was 50 years of age, and had borne 5 children. Her last child was 17 years old. Before the last confinement her health had been good. This labour was protracted, the presentation having been transverse. Ever since, she had been subject at times to pain in the back and right loin. It used to come on suddenly, increase in violence, and produce shivering and nausea. After 6 or 8 hours it would cease. Her urine at the time of the attacks was usually thick, with a yellowish sediment; at other times it was clear. For 5 years such attacks recurred pretty regularly every 6 weeks. Then, after a more active life, they recurred more frequently, scarcely a week intervening from one to another. In 1860 the catamenia ceased, and the attacks became milder and less frequent, and she was entirely free for a year or more. In 1862 the pains suddenly recurred with more violence than ever. After great suffering for several hours 'a dozen or two of little stones, as large as a pin's head,' were passed with the urine. From that time to the present attack she had been quite well. On May 8, 1865, while out walking, she stumbled and fell upon her abdomen. She was lifted up, complaining of great abdominal pain. She got home, went to bed, and next day the pain was so great that she was unable to get up. During the next 6 days she passed a good deal of blood in the urine, and she perceived, for the first time, a tumour as large as a cricket-ball in the right side of the abdomen. On the 15th the pain, which had almost ceased, returned suddenly with great violence, and I was sent for. She was much relieved by an opiate prescribed; and I made a careful examination of the tumour. It could be felt below the right false ribs, but its margins could not be made out very distinctly. They appeared to be overlapped, on the right by the cæcum, and on the left by small intestine. Wherever the tumour could be distinctly felt, it gave a dull note on moderately strong percussion, but a clear one on deeper pressure and sharper percussion. By pressure forwards with one hand on the right loin, while the other was on the front of the tumour, a trace of fluctuation was detected. Pain was kept in check by opiates, and on May 19th there was a prominent point near the middle of the tumour. Fluctuation being distinct, I inserted a very fine trocar at this point (which was midway between the umbilicus and right anterior superior spine of the ilium) and drew off between 2 and 3 pints of thin pus, by a syringe attached to the canula by an air-tight joint. The urine, before the tapping, had been clear, but the day after it was found by Dr. De Mussy to be loaded with pus. On the 27th, notwithstanding continued escape of pus through the bladder, the tumour was as large as before the tapping. I therefore tapped again, and after removing 2 pints of pus, left the wound unclosed. There being no discharge after 2 days, I inserted a laminaria tent, having reopened the wound with a lancet.

A very free discharge went on for the next fortnight. At first it was purulent, but afterwards it consisted of clear fluid, which was found to contain urea. The urine became clear and free from pus. Early in the morning of June 20 great desire was felt to pass water. After much difficulty and pain a calculus of uric acid and urate of ammonia, as large as a broad bean, and much of the same shape, was passed, and was soon followed by a second of similar dimensions. Relief was immediate. On July 1 there was still a little discharge, perhaps 1 ounce in 24

hours. The abdomen was everywhere clear on percussion; but on deep pressure a hard painless tumour, as large as an orange, was to be felt in the right loin. After a few weeks this could no longer be felt. She died in 1880, after several years of good health.

This case is in many respects very instructive. The patient probably had a tendency to deposit uric acid before her last labour. The effects of that protracted labour led perhaps to the train of symptoms which ended, for a time, in the passage of numerous small calculi. Then, in 1863 or 1864, two renal calculi began to form, and set up chronic pyelitis. The fall in 1865 dislodged the calculi, and they blocked up the ureter. The pus and urine accumulated behind the calculi and distended the pelvis of the kidney into the cavity from which I removed the large quantity of pus at the first tapping; and it was not till the calculi passed on into the bladder and left the ureter free that the formation of pus ceased and the artificial opening closed.

Renal cyst with calculi; tapping.—A single lady, 59 years of age, first consulted me in June, 1865. She had then a tumour which filled all the left side of the abdomen and extended upwards under the left false ribs. It had been observed for nearly 2 years, but its increase had only been rapid for about 6 months. In August 1866 fluctuation was detected in the upper part of the tumour, and 5 or 6 pints of yellowish pyoid fluid, with mucous flakes floating in it, were removed by tapping. A roll of intestine adhered to the upper part of the tumour on the right side. Relief followed the tapping for a time; but a second tapping was necessary in November. The true nature of the tumour then became apparent. The presence of intestine in front of the tumour, and the limitation of the tumour to the left side of the abdomen, while the uterus was freely movable, were the chief guides in diagnosis, as the urine was normal, and there was nothing characteristic in the fluid removed by tapping. In April 1867 the patient fell when out walking and ruptured the cyst. She died 28 hours afterwards; and Dr. Morton, of the Abbey Road, found a large quantity of turbid fluid in the peritoneal cavity, corresponding with similar fluid found in a large ruptured cyst of the left kidney. The renal tumour filled all the left half of the abdominal cavity. Its lower end dipped down into the pelvis, but was quite free. Its upper end adhered to the spleen. The ruptured cyst contained, besides the fluid, a quantity of very thick viscid mucus, and seven calculi of varied chemical composition. The largest was $1\frac{1}{2}$ inch in its long diameter; the smallest was as large as a hazel-nut; two were smooth; five were rough, and very irregular in outline. One calculus was loose in the cavity, as well as a quantity of lithic acid gravel. The other calculi were imbedded in the pelvis and dilated calyces. The ureter was completely occluded, and no communication could be found with the bladder. The right kidney was slightly enlarged. The uterus and its appendages were healthy. The calculi are in the Museum of the College of Surgeons.

Renal cyst; tapping.—In 1875, a young lady, 22 years old, was brought to me from Boston, U.S., with a history and description of her case as one of simple ovarian cyst. She had suffered a good deal with bladder irritation, without much injury to her health. I found a fluctuating tumour about the size of a cocoa-nut on the right side, between the pelvis and umbilicus. Urine sp. gr. 1012, pale, cloudy, acid and albuminous, with granular corpuscles, single and in groups, varying in size, some with single, others with several smaller nuclei, and like pus corpuscles.

On July 3 I tapped and drew off 4 pints of slightly opalescent fluid, sp. gr. 1006, which, though it frothed when poured from one vessel to another, looked like pure water. Reaction alkaline, and heat caused no change. The chemical tests were equivocal, and the microscope showed nothing. On July 13 the urine was found to be charged with pus, disintegrating red blood-corpuscles, and an immense number of round and irregular shaped epithelial cells, undergoing vacuolation, and proliferating. These cells were not bladder epithelium, and it remained doubtful whether they were from some new growth, or from the irritated surface of the ureter.

Great temporary relief was afforded by the tapping, and the patient went to Edinburgh, where she was again tapped by Dr. Keith. I saw her in Edinburgh in August 1875, and left her in Dr.

Keith's charge. After about 6 weeks several pints of pus escaped in the urine. In October she returned to America. Before long an abscess in the loin was opened. A fistula remained, and at the end of about 6 years she wrote to Dr. Keith, saying she was very well, weighing 140 pounds. Subsequently the fistula not closing, it was injected with strong carbolic acid. All sorts of troubles followed, and I heard of her in the autumn of 1883 as being quite bed-ridden. If one had known 10 years ago all that we now know of renal surgery, as soon as tapping the cyst had proved to be merely palliative, something more than injection and drainage would certainly have been suggested.

Tapping and draining renal cyst.— Towards the latter end of 1877, not long before I changed my position of surgeon to the Samaritan Hospital for that of consulting surgeon, I admitted a young countrywoman with 2 tumours, both deeply attached in the situation of the kidneys. Fluctuation was quite distinct in the right tumour, but could not be made out in the left, which was small. There was no tenderness in front, but it was marked in the lumbar region on the right side, where there was also redness, swelling, and fluctuation. The right thigh had also swollen since the back had become bad. She dated the first signs of her ill-health to what was said to be an attack of inflammation of the kidney, 2 years after her confinement, when she was only 15.

On November 21 I tapped the tumour in the right loin, leaving a tube in the cyst for drainage. An immense quantity of fluid came away into the bed, rendering the cyst quite flaccid. The next day there was nearly the same amount of discharge. Then it became purulent, and the tube was shortened, after which the discharge resumed its serous character. Urine was all the time abundantly secreted. During the month of December the discharge gradually diminished, the tube was withdrawn, and on the 31st I handed her over to Mr. Thornton with not even a stain on the gauze bandage. She went home appearing to be very well on January 9, 1878.

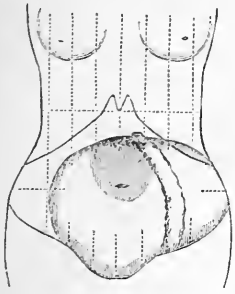
Subsequently, however, the wound reopened, and gave exit to a quantity of white, glistening, fatty fluid, with great relief to an attack of gout in both feet. She soon recovered from this, but at the end of 2 years reappeared with an ovarian tumour (right side), which Mr. Thornton removed. During the operation he verified the diagnosis of the cyst tapped as being renal. In the course of convalescence the renal cyst refilled, burst, and healed. Then, at the end of some weeks, the left side had to be dealt with by tapping and draining. Again she recovered, and again in 15 months' time was discharging fluid, with cholesterine, from the right side, and this lasted for 14 months. Once more, in February 1883, she was reported to be in excellent health in all respects. She has since married again, and is now (1885) quite well.

INCISION AND EMPTYING RENAL CYST

The following case of *Cystic Degeneration of the Left Kidney*, which was mistaken for a cyst of the left ovary, is not less instructive:

On October 10, 1866, a married woman, 43 years of age, called upon me with a letter from Dr. M'Donnell, of Stoke Newington, containing a very full and accurate history of her case. She had been married 25 years, and had 9 children. Dr. M'Donnell wrote as follows: 'In April 1862 she sought my advice for a hard swelling situated in the hypogastric and left iliac regions, the size of an infant's head. Examination externally, and *per vaginam*, convinced me it was an ovarian tumour. In 1854 and 1855 a swelling was complained of, and had been the subject of conversation between husband and wife, but no advice was asked for at the time. Aching pain was felt, from time to time, in the tumour without causing any alarm. It had increased so much in the early part of 1863 as to suggest the question of pregnancy. In 1863 the tumour increased in size, extended to the epigastrium, and encroached so much on the chest as greatly to impede the breathing, and even prevent her moving about in bed. Assisted by Mr. Forman, of Stoke Newington, on August 4, 1866, I withdrew, by tapping in the linea alba, 2 gallons of dark discoloured fluid, of the consistence of pea-soup. The opening was made midway between umbilicus and pubes. Her strength and spirits have much improved, though the cyst has refilled.'

It was rather more than 2 months after this tapping when I first saw the patient, and I then advised her to come into hospital before she became as much distressed as she had been before the tapping. She was admitted on December 17, 1866. The tumour then occupied the position shown in the annexed dia-



gram. At the upper and central part there was a patch of crepitus, giving the feeling of adhering omentum; and all down the front of the tumour, about an inch to the left of the umbilicus, was a cordlike ridge, which was taken by some who examined it for intestine, though it felt very like a large, long, and thick Fallopian tube. The measurements were: Girth at the umbilical level, 36 inches; from umbilicus to ensiform cartilage, 9 inches; to symphysis pubis, $7\frac{1}{2}$ inches; to right ilium, 9 inches; and to left ilium, $9\frac{1}{2}$ inches. There was some mobility in the tumour, both vertically and laterally. Fluctuation was distinct across the whole tumour, in all directions. The left loin was dull on percussion, the right tympanitic. The uterus was high, the os hard and fissured, admitting the tip of the finger; the cervix short. No part of the tumour was below the brim of the pelvis. The catamenia were expected in a few days. They recurred regularly every 3 weeks—lasting 5 days. Dr. Junker examined the urine and reported —'No albumen; deposits—urates, mucus, and epithelium.' She was subject to occasional nervous attacks, during which she was partially unconscious. She said they began by palpitation. She had four while in hospital; but they were regarded as hysterical, and attracted little attention. The catamenia came on, and ceased on December 29; and on January 3, 1867, chloroform having been administered by Dr. Junker, I made an incision 5 inches long, extending downwards along the linea alba, from 1 inch below the umbilicus. On opening the peritoneum, I at once found that the hard roll, or ridge, observed running down the front of the tumour was part of the transverse and descending colon, adhering closely both to the cyst and to the abdominal wall. I separated some of these attachments, in order to tap the cyst safely. On introducing the trocar, about 15 pints of fluid escaped. It had the appearance of pea-soup. When the cyst was empty I made some further separation of omentum and intestine; and when passing my hand round the right side of the cyst, what appeared to be another cyst gave way, and between 1 and 2 pints of clear fluid escaped. I then found that the deep attachments of the cyst were too close to admit of separation; and after tying 3 vessels which were bleeding in the separated omentum, and cutting off the ligatures short, I closed the wound.

The patient rallied slowly from the chloroform, and complained of pain, which was relieved by an opiate. Two other opiates were given at night—the total quantity given amounting to 50 minims of laudanum. Three hours after operation a small quantity of clear urine was drawn off by the catheter. After this not a drop of urine entered the bladder. At 10 P.M. the temperature was 98·4°; pulse 116; respiration 28. The next morning the pulse was 120, and very feeble; skin dry; temperature 98°; respiration 30. She was comatose, but easily roused, and answered questions sensibly. The coma gradually became more profound, and she died 30 hours after operation.

On examining the body 17 hours after death there was no *rigor mortis*. The wound had united well. There were about 4 pints of blood-red serum, and a small teacupful of blood-clot in the peritoneal cavity. The right kidney was enlarged, and very soft; the cortical substance very friable, pale yellow in colour. The calyces and pelvis were much dilated; and the thin sac formed by this dilatation had given way longitudinally. A calculus, weighing 40 grains, was in one of the calyces, forming a perfect cast of the calyx. The bladder was contracted and empty. The uterus and ovaries were healthy. The left kidney formed the cystic tumour, which is described as follows by Dr. Junker:

'The left kidney formed a cyst larger than an adult head. It presented one large cavity, composed of several wide pouches, arranged vertically at one side of the principal cavity. The stroma which formed the external wall was of varying thickness; thicker and stronger at the base of the pouches; thinner and less dense around the main cyst. It had a serous external coat; at some places hypertrophied, at others atrophied. Next a fibrous structure (fibrous capsule of the kidney). This was followed by what appears to have been the cortical substance of the kidney, and from which portions could be traced into the septa (the former columnæ Bertini) which separated the pouches (the expanded calyces). The main cyst (the original pelvis) was formed by the peritoneal and fibrous capsules. The medullary portion could not be well distinguished by the naked eye from the thickened lining membrane. Thus the tumour appears to be a good specimen of genuine hydronephrosis, in which pelvis and calyces expand into a large cavity, and produce by pressure atrophy of the original structures of the organ.

'The peritoneal coat was rough with shreds of the broken-down, extensive, and intimate adhesions. Some of the neighbouring organs, or portions of them, were so intimately connected with the tumour that their separation was impossible, and portions had to be cut off in order to remove the cyst.'

Incision, and opening renal cyst.—Another case of great practical interest is that of a girl in her 16th year, who was sent to me by Dr. Wardell, of Tunbridge Wells, on account of an abdominal tumour. She was a fat, florid girl, and apparently in robust health; but her abdomen began to enlarge when she was about 12 years old, and went on increasing, not attracting any particular notice till May or June 1871, when she was seized with some pain on the right side. This lasted only a few hours, and was followed by swelling, also on the right side, which disappeared after some days' rest, the general enlargement remaining. Dr. Wardell first wrote to me about her in October 1871. A month later he wrote that the tumour was enlarging, and she was admitted into the Samaritan Hospital early in December. On December 15 the girth at the umbilical level was 35 inches, distance from sternum to pubes 15 inches, and from one ilium to the other, across the front of the abdomen, 15½ inches. Fluctuation was distinct all over the lower part of the abdomen, and the movement of a cyst was distinctly visible between the umbilicus and sternum—rising and sinking with the respiratory movements—the upper border of the cyst being about half way between the sternum and the umbilicus. On both sides of the abdomen the sound was dull on percussion; so it was from the pubes to within 2 inches of the umbilicus. From thence to the upper border of the cyst in the centre it was resonant or tympanitic, and on pressure with the fingers the peculiar gurgling and contraction of intestine could be felt. It was quite clear, therefore, that we had intestine adhering in front to the upper part of the cyst. Both loins and flanks were clear on percussion, the right more distinctly so than the left. The uterus was normal in size and situation. On the right side of the vagina a soft fluctuating mass (the lower part of the cyst) could be felt just above the brim of the pelvis. The catamenia appeared when she was 14, and continued regular for 4 months, then ceased for 4 months, and since then have been regular but excessive, lasting a week. There was some irritability of bladder. Owing to a mistake, the urine was not examined.

The girl was kept in hospital, and on January 23, 1872, the girth had increased to 37 inches, and each of the other measurements showed an increase of about an inch. The presence of intestine in front of the cyst led to the suspicion of hydronephrosis; but the resonance of both loins and the fact that the cyst could be felt by the vagina on the right side, almost negatived this suspicion, and it appeared more probable that we had to deal with a multilocular ovarian cyst, to which intestine adhered in front. I made an exploratory incision on January 24, and at once came upon the cæcum, its appendix, and the ascending colon, which had been pushed upwards and across the median line by the cyst, which was behind it. I saw at once I had to deal with a hydronephrosis; so, pushing aside the intestine, I tapped the cyst. Twelve pints of fluid escaped through the canula, and I then found that the uterus and both ovaries were healthy. When the cyst was empty I fixed the opening in its wall to the abdominal wall by a harelip-pin, and then closed the wounds by sutures. A small

cyst in each broad ligament I felt, but did not disturb.

The fluid removed from the cyst was clear, light yellow in colour, with a faint urinous odour, acid reaction, and specific gravity of 1006. On standing a few flocculent clouds formed and some red blood-corpuscles were deposited. On careful chemical examination, urea, urates, and chlorides were found in about the normal proportions of healthy urine. There were traces of uric acid. A very small amount of albumen and phosphates, but no traces of sugar could be detected. On microscopic examination of the deposit large numbers of red blood-corpuscles were seen, a few pus cells, some squamous epithelial cells and granular cells, but neither tube-casts nor crystals.

The fever which followed the operation and caused her death on the 4th day was so remarkable that I may refer those interested in the subject to a lecture on the case, which was published in April 1872, in the 'Medical Times and Gazette.'

NEPHROTOMY

Nephrotomy; removal of sarcoma from interior of renal cyst.—In May 1879 a Greek lady came to me from Dr. Whitehead, of Manchester, supposed to be suffering from a solid movable tumour of the right ovary, sufficiently large to call for extirpation. Dr. Whitehead had seen her several times between 1868 and 1871 on account of dysmenorrhœa and several early abortions. He did not see her between 1871 and 1877, when she went to him on account of abdominal enlargement; but he could not detect any tumour. Her next visit was in May 1879, and then he found 'a large, solid substance, non-fluctuant, on the right side, somewhat diffused, extending towards the hepatic region. It had not the usually defined limits of an ovarian tumour, yet, in the absence of the great suffering commonly met with in aggravated kidney disease, and the urine being normal, and as a perceptible impingement of the tumour was felt against the left hand on tilting the uterus up with the right, I was led to suppose its nature to be ovarian.'

In 1881 and 1882 I saw this lady occasionally in consultation with Sir W. Jenner. We both at first believed that the tumour was one of the right kidney. But as it became more fluctuant and increased in size, and the urine proved to be normal upon careful and repeated examination, and the general health was beginning to suffer, I made an exploratory incision in 1882, assisted by Dr. Griffith, of Camberwell, and Mr. Meredith, Dr. Day administering methylene. It was at once evident that the tumour was renal, but as it appeared to be cystic I tapped it. No fluid escaped, but some soft brainlike substance. On enlarging the trocar opening, several pounds of this substance, in soft masses, came away, and with it a good deal of blood. By passing my hand into a cystlike cavity I was able to press and scrape away a quantity of soft granular substance, portions of a growth loosely adherent to the inner surface of the cavity, very much like the endogenous sprouts of a proliferating cyst. The cavity was evidently the dilated pelvis of the kidney, the cyst its cortical layer, expanded and covered by peritoneum, which it had pushed forward. The cavity was only opened enough for me to pass in my hand, and by carefully holding the edges of the opening forward, none of the morbid material or blood entered the peritoneal cavity. There was such free bleeding from the inner walls of the cavity that I stuffed it full of carbolised sponges, and had some pressure kept upon these while I was passing the sutures. These included the edges of the opening in the renal cyst, as well as the whole thickness of the abdominal wall. I then gradually removed the sponges, pressure being all the while kept up. I thought of tying the renal vessels and removing the kidney. I also thought of leaving a drainage-tube in the cyst, for the oozing of blood was not quite stopped when I took out the last sponge. The patient was so exhausted that I was sure she could not survive nephrectomy. If I had left a tube in I feared the bleeding would go on; so I closed the wound and made firm pressure by pads and a bandage. She remained in a state of profound collapse for 5 or 6 hours, pulse almost, sometimes quite, imperceptible; she was cold and sometimes quite unconscious. Ether was injected subcutaneously, brandy freely given by the mouth, and beef-tea and milk by the rectum. Dr. Griffith stayed with her all night, and to his assiduous care for several following days I attribute her gradual and complete recovery. There has never been any reappearance of the renal tumour since the

operation, the urine has been almost always normal, and I saw her near the end of 1884 in excellent health. The masses removed weighed more than 9 pounds, and Mr. Meredith reported to me that, on microscopical examination of different specimens of the material from the cyst, he found that 'the growth was undoubtedly a spindle-celled sarcoma, apparently undergoing caseous changes. The spindle cells were large and very distinctly nucleated.'

NEPHRECTOMY

Enlarged cancerous kidney; excision. On December 9, 1882, in consultation with Mr. Hewer, of Highbury, I saw a German gentleman, aged 58, who was suffering from the effects of repeated attacks of hæmaturia, supposed to depend upon an enlarged left kidney. The amount of blood lost had seriously affected the general health, and on different occasions it had been with difficulty that the bladder had been cleared from clots. There was no evidence of any disease of the bladder nor of the right kidney. The left kidney appeared to be about 4 inches in breadth and 6 inches from above downwards; extending from the iliac fossa upwards under the left false ribs, and centrally nearly to the umbilicus. It was slightly mobile, and could be pushed to the right a little beyond the umbilicus. Feeling that the surgical difficulties in removing the kidney would not be great, and that the patient was not likely to live long if it were not removed, I advised early operation, and was supported by Mr. Hewer.

The patient took time to consider the question, and consulted his old friend, Dr. Herman Weber, who informed me that in December 1880 he had observed the movable tumour, which had first been noticed by the patient himself a year before this visit.

'In August, 1881, Mr. K—— was at Margate, and one day the urine was bloody. On the following day he came up to me, when I found the urine quite free from blood and albumen, perfectly clear, and normal. The first severe bleeding occurred in May 1882, when I had not seen him for 8 months. It ceased completely under the administration, by Mr. Hewer, of turpentine in capsules. In July and August he went to Germany, and was so well that he could climb moderate mountains. By that time I had attributed the tumour to the kidney, and feared that probably it was malignant.'

Three days after my first visit Mr. Hewer wrote to me: 'December 12, 1882, the patient is losing more blood and consents to the operation, which, I think, should be done with as little delay as possible.' Proposing to operate the next afternoon, Mr. Hewer telegraphed to me, 'Patient not so well, please make operation, if possible, to-morrow morning.' Accordingly, at 9 o'clock on the morning of December 13—Dr. Herman Weber and Mr. Hewer being present—Dr. Day administered methylene, and I was assisted by Mr. Meredith and Mr. Hewer's son, house-surgeon of St. Bartholomew's. Phenol spray was used and the usual antiseptic precautions were strictly observed. I made an incision parallel with, and about 2 inches to the left of the linea alba, extending from about 3 inches above to 3 or 4 inches below the level of the umbilicus. I meant to carry the incision along the outer border of the left rectus, but the muscle was spread out and some of its fibres were divided or separated all along the incision. Several small arteries were tied, and the peritoneal coat of the anterior abdominal wall was divided to the extent of 6 inches. The intestines were pushed aside, kept back by carbolised sponges, and the peritoneal covering of the kidney was divided to the same extent as the incision in the abdominal wall. Several large veins, which were divided with the peritoneal covering of the kidney, were tied. The kidney was then separated from its loose attachments and drawn out. The ureter was first temporarily secured by two pressure-forceps and divided between them. I meant to have tied the renal artery and vein before separating the kidney, but I could not feel the artery. I therefore compressed the connecting tissue with forceps, cut away the kidney, then transfixed with a double silk ligature behind the forceps, and tied in 2 parts. Loose portions of the peritoneal covering of the kidney were cut away and several ligatures were applied to small vessels. The incision in the abdominal wall was united by silk sutures.

Not much blood was lost during the operation, although it occupied nearly 1½ hour from the commencement of inhalation until the patient was in bed. Much time was lost in tying small vessels in the abdominal wall before opening the peri-

toneum, and in securing vessels in the divided coverings of the kidney; and, during the closing of the wound, there was unusual difficulty in keeping back the intestines free from the sutures.

The kidney is now in the Museum of the Royal College of Surgeons, and Mr. Eve's report on the specimen is as follows:

'The kidney is 6½ inches long and 4 wide. Its surface is largely nodulated or bossed, but the disease had not penetrated the capsule. The section of the tumour is white, soft, and marked by bands of fibrous tissue, which give it a lobulated appearance. Portions of unaffected kidney substance are situated at the upper and back parts of the section. Neither the ureter nor pelvis was compressed. Microscopically the morbid growth was a soft cancer, consisting of alveoli filled with small spheroidal epithelium.'

For 3 days after the operation the patient went on so well that I was hopeful of recovery. He suffered very little from pain or sickness, but the urine never became free from blood. On the 4th day the temperature rose to 102°, and the pulse became rapid and feeble. He was much worse at night, and died on the morning of the 5th day. The temperature just before death was 103°, and the last urine passed contained blood. No post-mortem examination of the body was permitted. This I very much regret, as I cannot explain the continuance of blood in the urine in the absence of any proof of disease of the right kidney or of the bladder, nor can I offer any reason of the precise cause of death. There was no evidence of more than slight peritonitis, nor of septicæmia. The chances of success would have been much greater if the operation had been done 6 months earlier.

If I should again be called upon to excise a kidney, I shall be more careful in bringing together not only the divided peritoneum of the anterior abdominal wall, but also the divided peritoneal covering of the kidney. In this case I was content with letting the two edges fall together; and it is probable that blood or serum, exuding from the tissues behind the peritoneum, passed into the peritoneal cavity, or that some portion of intestine became adherent there. Both these evils would be prevented by a few sutures. I had not seen this detail in the operative procedure described in cases of nephrectomy previously recorded; and I have not noticed any report of its having been tried in more recent cases. In the discussion which followed the reading of the above slightly abbreviated account of the case at the Medico-Chirurgical Society, it was argued that this would not be advisable; that it would be better that blood and serum should pass into the peritoneal cavity, and be absorbed, than retained behind the peritoneum in the loin. Indeed it was suggested that a counter opening should always be made in the loin when nephrectomy was performed by the abdominal incision, and that one of the chief advantages of the lumbar incision was the greater facility it afforded for drainage.

In the papers and discussions at the International Medical Congress in London, in 1881, on nephrotomy and nephrectomy, by Czerny, Langenbuch, Martin, Baker, Lucas, and Barwell, the situation of the abdominal incision and the relative advantages of the abdominal and lumbar incision were ably entered into; and quite recently the discussion has been renewed in the Royal Medico-Chirurgical Society, when Mr. Thornton's proposal to tie the ureter, and to fix it in the abdominal wound, was both supported and objected to. My own feeling is that in most cases of nephrotomy for renal calculus, or of nephrectomy, when the kidney to be removed is not very large, the lumbar incision should generally be preferred; whereas the abdominal incision is rather to be chosen whenever the kidney is much more than double the normal size. And, whenever the abdominal incision is chosen, that of Langenbuch has some advantages over an incision in the middle line. It may be made along the outer border of the right or left rectus, according to which kidney it is intended to remove. I also think Mr. Thornton has made out a fairly good case in favour of his practice of fixing the bladder end of the ureter outside the abdominal incision. He ties it with strong silk, and cuts it off so as to leave only just enough stump to pass a pin through and keep it from slipping into the wound. He cleans this stump with iodine, and packs it round with a little cotton moistened with tincture of iodine, until the peritoneum is well sealed. But it is quite certain that we require a larger number of cases, fully and accurately reported, before these and other practical

details in the operative surgery of the kidney can be considered as settled.

Solid peri-renal tumours.—Since the case of nephrectomy just recorded, I have removed 2 very large solid tumours formed, in the same patient, around the right and the left kidney. One tumour weighed 16½ pounds, the other 14½ pounds, and part of the left kidney was attached to the tumour of that side. This portion of kidney, with part of the tumour attached to it, is preserved in the Museum of the College of Surgeons. I removed the tumours in November 1883, and the following report upon them, by Mr. Eve, was published in the 'British Medical Journal,' April 19, 1884:

'The portion of kidney on the tumour comprises more than one-third of the lower end of the organ. A calyx and papilla may be seen upon the torn surface; they afford conclusive evidence that the pelvis was opened. Within the calyx is a small mass of fat. A section of the kidney has a normal appearance. Surrounding the surface of the kidney is a tolerably firm, greasy, pale yellowish white substance, evidently consisting, in great part, of adipose and fibrous tissues. It is in close contact with the capsule of the kidney, but is only adherent to it over a surface about ½ an inch in length. The capsule can be easily separated from the kidney at this point, leaving the subjacent parenchyma perfectly smooth.

'The portion of the tumour from the opposite side was slightly more fibrous in texture, but otherwise similar in its naked-eye characters.

'In minute structure, both tumours consisted chiefly of adipose tissue. The fat-cells were large, and closely approximated. There were also many large tracts and bands of fibrillar connective tissue, consisting of a close interlacement of delicate fibrils, which give it somewhat the appearance of mucous connective tissue, but stellate cells were absent. The blood-vessels were large and numerous, and around them were masses of small, round, so-called "indifferent" cells, which could be traced through transitions, by elongation, to the formation of fibres.

'The formation of fat was evidently secondary to the growth of fibrous tissue, the advance of the fat-cells into it being apparent; while the various stages in the transformation of the fixed connective tissue corpuscles into fat-cells were distinctly seen. Sections, cut through the point where the tumour was adherent to the kidney, showed that numerous parallel fasciculi of fibrous tissue intervened between the kidney-substance (which was healthy) and the tumour.

'The anatomical relations of the tumours to the kindeys, and the microscopic examination, support the view that the tumours originated neither in the pelvis nor capsule of the kidney, but in the circumrenal connective tissue.

'Histologically, they were fibro-lipomata, and no grounds exist for believing them to be in any part sarcomatous, since the young cell-element exhibited a distinct tendency to form mature tissues, either fibrous or fatty. A complete immunity from further disease may, therefore, be anticipated, provided that the growths were completely removed.'

The lady was 48 years of age; was married when 21; had never been pregnant; had begun to suffer from abdominal trouble in 1874; and in 1878 was sufficiently large for pregnancy to be suspected. The enlargement had gradually increased. Ever since 1881, owing to prolapsus of the uterus, a ring-pessary had been worn until the day of operation, and numbness and stiffness of the right leg had been troublesome. The catamenia had been regular, and the urine was always normal when examined.

I had been very doubtful as to the precise character and origin of the tumours before operation, simply saying that there were 2 solid tumours, so movable that I did not think there could be any unusual difficulty in their removal. On making the incision usual in ovariotomy, a growth resembling an ordinary fatty tumour was seen to be covered by layers of loose serous membrane, just as in tumours covered by the broad ligaments of the uterus. This membranous capsule was divided, and the tumour easily shelled out from a large deep cavity in the left side of the pelvis and left loin. Attached to the deepest part of the tumour was a piece of dark red tissue, which I at first thought was a part of the spleen; but which afterwards proved to be about a third of the left kidney. The remaining portion of the kidney and the ureter were then seen at the bottom of the capsule. There was very little bleeding. The capsular cavity was carefully sponged, and the edges of the divided

capsule were placed in apposition, but no sutures were used.

Another large tumour was then found similarly situated on the right side, and was removed in the same way; but the right kidney was neither injured nor seen. The only other difference in the proceeding on the two sides was, that the ascending colon led to no difficulty; while, on the left side, the descending colon was attached to the tumour anteriorly, and was pushed aside after dividing the serous capsule of the tumour. There was not much blood lost, only a few small vessels requiring ligature.

The patient recovered quite as well as after an ordinary ovariotomy. In quantity and appearance, the urine was quite normal. Dr. Hilder once or twice found some small clots of blood in the deposit, but, he said, 'none as large as a pin's head.' She remained in good health for several months, but towards the end of 1884 I heard from Dr. Habershon that he was attending her on account of considerable enlargement of the liver.

Addressing the Midland Medical Society last November, I made the following remarks upon the surgical treatment of renal and peri-renal tumours:

'Nephrotomy, nephrolithotomy, pyelolithotomy, and nephrectomy, terms hardly entering into surgical literature twenty years ago, define operations which are now performed in increasing numbers, and, especially to the physiologist, with a wonderful success. My colleague, Knowsley Thornton, can boast of 10 nephrectomies, all by abdominal section, as well as 4 nephrotomies and 3 nephrolithotomies—the whole 17 cases successful. These cases, and 7 successful cases of pyelolithotomy out of 8, as lately recorded by Anderson, can only be the effect of rigidly abiding by the observance of what we now know to be the rule and criterion of good work. So also with a variety of solid and semi-solid abdominal tumours, originating in the pelvic cellular tissue, or in the peri-renal fat, or in the mesentery, the appendices epiploicæ, the omentum, or the abdominal wall, extirpation is effected with a loss of life so small as would have been almost incredible a few years ago.'

CHAPTER V

LIVER AND GALL-BLADDER

ABSCESS AND HYDATIDS—DISTENDED GALL-BLADDER—GALL-STONES—CHOLECYSTOTOMY AND CHOLECYSTECTOMY

What has been said of peritoneal surgery in relation to the spleen and the kidneys may appear at first sight to require some modification when we pass on to the liver and gall-bladder. But it must be remembered that it used to be considered essential to the success of any surgical treatment of abscess or cysts of the liver, of so-called dropsy of the gall-bladder, and of the removal of gall-stones, that the peritoneal cavity should be closed by adhesions between the visceral and parietal peritoneum, before any opening into liver or gall-bladder was made. Opening the peritoneum when non-adherent, as the first step of operative treatment, is one of the most recent advances in abdominal surgery. Thudichum and Handfield Jones had stimulated the ambition of their surgical brethren; but it was not until the example of Marion Sims, and the attention excited by the very remarkable paper which he published in the 'British Medical Journal' in June 1878, that the present generation of surgeons entered upon the path which he opened for us. It is true that Sims had been preceded, in 1867, by another American surgeon, Bobbs, who, after opening the gall-bladder and removing some 50 stones, closed the opening by stitches and did not attach it to the abdominal wall. The patient, a woman 30 years old, recovered. Sims does not seem to have read or heard of a very remarkable paper, entitled 'On Tumours formed by Bile retained in the Gall-Bladder,' written 150 years ago (to which attention was drawn in 1879 by Mr. Hulke), communicated by Petit to the French Royal Academy of Surgery in

1733, and published, in 1743, in the first volume of the Memoirs of the Academy. In this paper Petit records 2 cases observed 25 and 28 years before, where considerable tumours in the region of the liver were opened in the belief that one was a cyst and the other an abscess, both proving to be the distended gall-bladder, and death following escape of bile into the peritoneal cavity. He relates a third case where he was about to open a similar tumour, when it disappeared, and a large quantity of bile soon afterwards passed with purging. In a 4th case, a supposed abscess was opened, and a biliary fistula was the result, through which a gall-stone was removed 7 or 8 months afterwards. In another patient a considerable tumour disappeared after the vomiting of 3 pints of very green bilious fluid. Petit wisely says: 'In such difficult cases mistakes are not faults when one has the courage to publish them; but they become crimes when pride leads to concealment.' After a careful description of the mode of distinguishing between cases of abscess of the liver and distended gall-bladder, Petit says that in some cases abscess, retention, and gall-stones are all observed together. He then traces the parallel between bile retained in the gall-bladder with gall-stones, and retention of urine with urinary calculi—showing that, as the latter occasionally pass by the urethra, the former pass the duct into the intestine; that when retained in the gall-bladder they may be numerous and of large size, and in thin patients distinctly felt and heard; and when they occlude a duct may do as much harm as a stone blocking a ureter or the urethra. He then shows that the danger of opening a distended gall-bladder which is not adherent to the abdominal wall, is not to be feared when adhesions have formed, and that gall-stones may be removed through a biliary fistulous opening. He relates a case where, 7 years after recovery from severe symptoms of distended gall-bladder, it was found that adhesions and communication with the colon had been completed by nature; and he says that when adhesions have formed, not only may a gall-bladder be opened and a fistula safely formed, but 'surgery may be enriched by another operation; I mean the extraction of stones from the gall-bladder. The existence of the stone, and the adhesion of the gall-bladder being ascertained, the operation will be without danger.' He describes the mode of sounding for gall-stones, by first tapping with a trocar, and then passing a long flexible probe through the canula, which, when a stone is found, serves as a guide to a bistoury. An opening is made of sufficient size to admit forceps and remove stones. In one case he removed in this way a stone as large as a pigeon's egg successfully; and he relates other cases where numerous stones were found after death which might have been safely removed, as adhesions were firm. In one case, after a spontaneous opening, a large number of stones came away during 2 months, when the fistulous opening was enlarged after sounding, and a stone successfully removed. He says, also, that this has been done by other surgeons after dilating the opening by sponge tents. In one case a stone, 3 inches in circumference and 4 inches long, was broken into several pieces by the forceps before extraction; a 2nd stone was also removed, and perfect recovery followed.

Godefroy Müller's incision of a biliary fistula, and extraction of a gall-stone after breaking it up, might have been compared with a combined lithotomy and lithotrity.

In the chapter on Diagnosis, at page 26, some record may be found of cases where I have tapped and aspirated hydatid cysts of the liver, and a few remarks upon injection of iodine and drainage. I have never tapped the gall-bladder nor removed a gall-stone myself; but I once assisted Mr. Meredith in removing 3 gall-stones, which together weighed 1 ounce and 26 grains. We had both carefully studied the case of Sims's patient. She was 45 years of age. Sims removed from her distended gall-bladder 24 ounces of fluid and 66 stones. He then cut away part of the gall-bladder and sewed the other part to the abdominal wall, thus forming a biliary fistula. After death on the 9th day, 16 more stones were found in the gall-bladder. In the same year (1878) Kocher, of Berne, did the first successful intentional cholecystotomy, as Bobbs's operation was exploratory. Kocher's patient was a woman 30 years old. The gall-bladder was the size of a man's head, and contained pus and 32 stones. A fistula was formed in this case. As a result of experiments on dogs and cats, proving that the gall-bladder in these animals may be safely extirpated,

Langenbuch, in 1882, not only removed 2 gall-stones from the thickened and distended gall-bladder, but he tied the cystic duct with silk and dissected away the gall-bladder. His patient, a man 43 years old, recovered. Also in 1882, Winiwarter cured a man, 34 years old, by establishing a communication not only from the dilated bladder through the abdominal wall, but also into the transverse colon. Several other cases—some of them very imperfectly recorded—may be referred to in an able paper by Musser and Keen in the 'American Journal of the Medical Sciences,' of October, 1884. These writers justly give Thudichum the credit of being the first to propose the operation of cholecystotomy in his paper on gall-stones in the 'British Medical Journal' in 1859; but they claim for Bobbs and Sims the merit of having been the first to carry the proposal into practice. What remains for us is to perfect the different steps of the operation. In Mr. Meredith's case, after exposing the distended gall-bladder, he emptied it by a fine trocar, drew the walls carefully forward, opened the cystlike cavity, and extracted a gall-stone by forceps. It was proposed to stitch the opening to that in the abdominal wall; but there would have been so much traction that it was thought safer to close the opening in the gall-bladder by sutures and return it. We thought of tying up the opening by a circular loop of silk, like a purse; but found it difficult to accomplish.

After death it was found that the gall-bladder contained about half a pint of bile, the cystic and common ducts were quite free, and there was bile in the duodenum. The opening in the coats of the gall-bladder was so well closed that there was no escape when the cavity was fully distended by injecting water, and yet some bile was found in the peritoneal cavity. Whether this escaped unnoticed during the operation, or oozed out during the short time immediately afterwards, before union was completed, must remain in doubt. The coats were so thin, that inversion and stitching of the serous coat only, as suggested before operation, was found to be very difficult or impossible. In any future case, the question whether a biliary fistula should be formed, or the opening in the gall-bladder be closed by sutures, or the gall-bladder cut away after tying the cystic duct, must be determined by the peculiarities of the case; and the possibility of establishing a fistulous communication between the gall-bladder and the intestine, after Winiwarter, supported as it is by the more recent experiments on dogs by Dr. Gaston, of Atlanta, Georgia—described in the 'British Medical Journal,' February 14, 1885—may also be borne in mind. What we need is further experience and accurate records of all cases. The reports of some of the more recent operations are so incomplete that they are quite destitute of any scientific or practical value.

CHOLECYSTECTOMY

or excision of the gall-bladder, has been successfully performed by Langenbuch, in a case where a thickened and adherent gall-bladder, containing many gall-stones, was first emptied by a syringe. The liver was raised, the stomach and small intestines protected by sponges, and the gall-bladder was separated from the liver by a few strokes of a scalpel. The cystic duct was tied in two places with silk, and the duct divided between the ligatures. Gross has also removed the gall-bladder; and Thiriar, of Brussels, brought a 2nd successful case of removal of gall-stones and extirpation of the gall-bladder before the Belgian Royal Academy of Medicine in February 1885. The patient was 25 years of age, in the 4th month of pregnancy. The report of the full discussion on these cases has not yet reached me, but we have already sufficient proof that this operation ought to be done rather than cholecystotomy when the gall-bladder is hypertrophied, or otherwise diseased. Indeed, it appears not very improbable that cholecystectomy may prove to be better practice than either the formation of a biliary fistula or suture of the opening in the coats of the gall-bladder after cystotomy.

CHAPTER VI

MESENTERIC, OMENTAL AND PANCREATIC CYSTS—UNDESCENDED TESTICLE

MESENTERIC CYSTS

My last work on ovarian and uterine tumours was published in May 1882. Up to that date I had not met with a case of a mesenteric cyst nor with a large mesenteric tumour. But within a month I had opened and drained a large mesenteric cyst, and had removed a large solid mesenteric tumour. Since that time I have not seen another.

The cyst was in a lady, 63 years of age, a patient of Dr. Duke, of St. Leonards. The daughter, then 33 years old, told me that her mother's illness was one of the recollections of her early childhood, and that the tumour began as a small lump on the right side of the abdomen and gradually increased. She had been under medical care for many years, and saw me in 1871 and 1872, when, as there were no urgent symptoms, I advised her to wait. She went on for more than 10 years without much increase in size, but latterly there had been a rather rapid increase, and her life had become that of an invalid. Dr. Sedgwick afterwards told me that, about the year 1858, he had suspected mesenteric disease, that Baker Brown had treated her for uterine disease, and Dr. West for movable kidney. I operated at St. Leonards, June 11, 1882, assisted by Dr. Duke, Mr. Ticehurst administering methylene. After a little peritoneal fluid had escaped, I tapped and emptied a very thin cyst, which contained about 6 pints of reddish-brown turbid fluid, quite free from odour, with broken-down blood clot and a good deal of cholesterine. On examining the interior of this cyst when emptied, I found that it had formed near the root and between the two layers of the mesentery, extending toward the cæcum and behind the ascending colon, its lower end being so spread over the upper part of the pelvis that I could not make out clearly either uterus or ovaries. The liver and spleen were both somewhat enlarged. After considering the question of drainage, we decided against it, and were content with carefully sponging out the interior of the cyst and closing the wound. The patient went on remarkably well at first. Dr. Duke wrote to me on the 19th that he had removed the stitches and the wound was healed, that the temperature had never exceeded 100° nor her pulse 90. But soon afterwards she became jaundiced, and, without there being any signs of the reformation of fluid, got gradually weaker and died on July 13. No post-mortem examination having been made, I regret that I cannot give a more complete account of this unusual case.

A mesenteric cyst was removed in the Beaujon Hospital, Paris, by M. Tillaux, from a man 31 years of age. It was about the size of the head of a fœtus. It was a cyst containing caseous matter springing from the mesentery by a pedicle. This was tied with catgut, the abdomen closed, and perfect recovery ensued.—'Lancet,' August 1880.

Again, in the 'British Medical Journal' for January 1883, Dr. C. H. Carter gives an account of a case with all the indications of a unilocular ovarian cyst. During the operation it was found that there were no pelvic attachments. The cyst rose from the left lumbar region, surrounded by coils of adhering intestine. It could not be removed, and treatment by drainage was adopted. The woman died on the 6th day, of septicæmia. There was a broad attachment to the side of the spine and the left lumbar region, closely packed in among the adhering bowels. On the left side of the cyst the peritoneal coat had been stripped off by an extravasation of blood from a large opened vein.

OMENTAL CYSTS

An interesting case of cyst of the great omentum, by Mr. Doran, may be found in the 23rd volume of the Obstetrical Transactions. Mr. Thornton published in the 'British Medical Journal,' in 1882, an account of a case of mesenteric tumour for which he operated in 1877, adding notes in the same paper of two cases where, in the course of ovariotomy, he

removed cysts from the omentum. One was as large as a cocoa-nut, with a thick, fleshy wall, attached to the omentum by a thick vascular pedicle, and was high up in the abdomen under the right border of the liver. The other was a very small multilocular cystic tumour, in a case of ruptured papillomatous cysts of both ovaries. This tumour was attached by a small pedicle to the lower border of the omentum and probably had its origin in cell infection. The tumour removed in 1877 was a large thin cyst connected with the mesentery of a portion of small intestine by a broad vascular pedicle. The left ovary and tube, being adherent to a fringe of solid growth along the lower border of the mesenteric cyst, were removed with it. The solid parts weighed 6 pounds 4 ounces, and there were 19 pints of fluid in the cyst. The patient was in good health 5 years afterwards.

Mr. Thornton alludes to other cases which might have been mistaken for omental tumours, but which resembled several cases that I have recorded, where, after twisting of the pedicle, ovarian tumours were completely detached from the uterus, and had derived their principal blood-supply from adhering omentum.

SOLID TUMOUR OF MESENTERY

Assisted by Mr. Jackson, Mr. Favell, and Dr. Redpath, Mr. Shaw administering methylene, I removed at Sheffield, on June 20, 1882, a solid tumour from a married lady, 40 years of age, a patient of Mr. Arthur Jackson. She had been married 18 years, but had no children, though she had a premature labour some months after marriage. Two or three early abortions followed, and no further pregnancy. She was in good health until about 4 years before, when pain in the iliac regions and slight abdominal enlargement were noticed; but no tumour was discovered until early in 1881. After that, increase was very manifest, with some apparent diminution after each menstrual period. Various opinions were given as to the nature of the tumour—some believing it to be ovarian, others uterine. I frankly confessed my own inability to give a positive opinion as to its nature or connections; but expressed a confident belief that I could remove it without any unusual difficulty or danger. It was quite solid, central in the abdomen, freely movable, about the size of an adult head, and imparting transmitted rather than associated movements to a uterus somewhat enlarged. Phenolised spray and all the usual antiseptic precautions and dressings were carefully employed. The tumour was solid, and its origin was clearly in the cellular tissue, at the root of the mesentery proper, near the lumbar vertebræ. The ascending colon was closely connected with the tumour in front, and to the right. All its blood-supply was derived from the mesenteric vessels. Those which were divided were secured with carbolised silk, the ends of all the ligatures cut off short, and returned. The uterus and both ovaries were healthy. No drainage was employed, and the wound was closed exactly as after ovariotomy. There was some sickness during the first 3 days; but recovery may be said to have followed without fever. The highest temperature was on the 3rd day, but was only 100°. The patient left her bed on July 12, and I saw her in London in the summer of 1884 in excellent health.

The tumour was sent to the Sheffield Pathological Society for examination and report. I have not yet received the report, which I much regret, as the removal of a solid mesenteric tumour may still be regarded as a surgical curiosity.

In the chapter on Diagnosis, several cases of abdominal tumours, both cystic and solid, which had been mistaken for ovarian cysts, have been recorded, such as distended bladder, fæcal accumulations, pelvic cellulitis and abscess, hæmatocele, hydatids, enchondroma or osseous tumours, curvature of the lumbar vertebræ, diseased lumbar glands, aneurism of the aorta and extra-uterine fœtation. Some of these were surgical curiosities, and illustrated the difficulties of diagnosis; in others the surgical treatment is related in connection with the history of the case, and will be found on referring to the chapter.

PANCREATIC CYSTS

Cases of hydatid cysts of the pancreas are on record; but the more frequent cause is obstruction of the duct by calculous concretion, or cancer—leading to cystic dilatation behind—compared by Virchöw to salivary cysts, and named by him 'Ranula pancreatica.' These cysts may

contain only a few ounces, but Bozeman has narrated a case where about 20 pints of fluid were drawn off, and the tumour, including the fluid, weighed 20½ pounds. He operated, believing the cyst to be ovarian; but found that it was pancreatic, with a pedicle nearly an inch long. The pedicle was tied, the cyst cut away, and the patient recovered. Rokitansky also operated in a case which he thought to be ovarian. He was prevented by adhesions from completing the operation, and the patient died on the 10th day. Other cases are on record where pancreatic cysts have been simply tapped, or tapped and drained, or opened after stitching the cyst to the abdominal wall. But pancreatic cysts must be very rare, as I have never seen one.

A case is related by Gussenbauer, in the 'Archiv. für Klin. Chir.' 1, xxiv. p. 355, 1884, of a man who, with pain, sickness, and emaciation, had a tumour in the epigastric region, extending over a space of 22 centimetres, and passing down as low as the umbilicus. An incision was made, and the wall of the cyst fixed in the wound, peritoneum to peritoneum. A portion of the fluid contents was taken away by trocar; then the opening in the cyst was enlarged, and a quantity of dark-coloured matter removed from the cyst wall, which was thin and smooth, and, when pressed back, allowed the finger to feel the pancreas and aorta. The man recovered, the cyst contracted, and only a thin colourless liquid was secreted, which had all the characters of the pancreatic juice. In about 3 months' time, only a small fistula, not more than 3 centimetres deep, remained.

UNDESCENDED TESTICLE

The only case which I have now to add is almost unique; a large abdominal tumour having been formed by the enlargement and degenerative changes of an undescended testicle. The patient was a middle-aged German gentleman, father of children, whom I saw early in 1878, in consultation with Sir James Paget. All the lower part of the abdomen was occupied by a solid tumour. The left testicle was normal, the right had never descended, but had not begun to enlarge, or at least to attract notice, until about a year before I saw him. As he was in fairly good health, and not suffering much pain, at Sir James Paget's suggestion he was put upon liquor potassæ in large doses, and went to the seaside. He returned after a few weeks with the tumour both larger and softer, suffering more pain, and the general health manifestly giving away. It was accordingly arranged in consultation that I should remove the tumour, and I accordingly did so on April 16, 1878.

Present: Sir J. Paget, Bart.; Dr. Oscar Liebreich, of Berlin; Dr. Junker; Dr. Woodham Webb; and Mr. Thornton. Dr. Day administered chloromethyl. Thymol spray was used, and all the instruments and sponges were bathed in warm thymol solution—1-1000. I made an incision in the linea alba from 1 inch above to 5 inches below the umbilicus. On dividing the peritoneum a free tumour was seen, very much like a large uterus covered by a thin membranous capsule, in which large veins ramified. Passing my hand backwards, I found such close attachments behind, that removal of the capsule (tunica vaginalis) would have been impossible. I accordingly divided the capsule in front, and began to separate it from the enlarged testis. In doing this, and pressing the whole tumour forward, a large cyst burst, and some 2 or 3 pints of fluid were expelled with great force. I then broke away all the loose portions of the tumour, and separated the deeper part from the capsule by tearing, and an occasional touch of the scissors. Several blood-vessels were temporarily secured by torsion forceps, and the vessels afterwards tied. All the ligatures were cut short, some portions of the capsule were cut off, all clot sponged from the cavity, and the wound in the abdominal wall closed with sutures, as in ovariotomy. Very little blood was lost. The operation lasted three-quarters of an hour. The patient soon began to complain of pain, and opiates were given by mouth and rectum. Nine hours after operation, about a pint of urine was drawn off by catheter. At night he was comfortable; had not been sick; pulse 100; skin moist; temperature normal. After this fever set in, and rapidly increased. He died on the 3rd day with precisely the same symptoms of peritonitis or septicæmia so often described as septic peritonitis, and the most frequent cause of death after the removal of abdominal tumours of any kind. Estimating the fluid which escaped at 2 or 3

pints, the whole tumour weighed about 9 pounds. It was sent to the College of Surgeons. No doubt was entertained as to the malignant character of the growth, but there was no evidence of disease having extended beyond the capsule. If it had not been for the septicæmia the patient probably would have recovered, and there would not have been greater fear of the recurrence of the disease or of its appearance in any other part of the body than if the diseased testicle had been removed from the scrotum.

CHAPTER VII

THE STOMACH AND INTESTINES

GASTROSTOMY; GASTROTOMY; DILATATION OF CARDIAC AND PYLORIC ORIFICES; PYLORECTOMY; OBSTRUCTED INTESTINE; ENTEROTOMY AND COLOTOMY; ARTIFICIAL ANUS, RESECTION OF INTESTINE; OPERATIVE TREATMENT OF PERITONITIS

All the operations included in the heading of this chapter have received, and are now receiving, a remarkable impulse from the influence which the revival of ovariotomy has had upon modern surgery. It is true that intestinal obstruction has been treated by colotomy, in one or other loin, since the days of Littré and Pillore, and of Callisen and Amussat. Dupuytren's treatment of artificial anus by his enterotome was in vogue more than 50 years ago. Gastrostomy, from the time of the experiments on Alexis St. Martin, though very rarely, has been occasionally practised to prolong life in cases where the œsophagus has been closed by malignant disease, or by the pressure of a tumour. But it is only by the experience of ovariotomists we have learned that, if intestine be accidentally wounded, and the wound be carefully and completely closed by sutures properly applied, the recovery of the patient is not hopeless; that even some portions of intestine may be removed and the patient recover, if the continuity of the canal is restored by suture. Although in one case where I did this, after removing 3 inches of intestine during ovariotomy, the patient died, it was proved that union of the intestine was complete, and that the death was not due to this complication. It was Kœberlé's extraordinary case, recorded in the Memoirs of the Société de Chirurgie, in 1881, where the patient recovered after the removal of more than 6 feet of small intestine, which first effectually aroused professional attention to the possibility of excising portions of intestine, and either restoring the continuity of the canal immediately by suture, or secondarily, after the temporary formation of an artificial anus.

GASTROSTOMY

I need not say more now of this operation than I said in an address delivered at Birmingham in Nov. 1884, that 'no one who has watched the progress of these operations, has considered the causes of death in fatal cases, and the details of the operative proceedings in successful cases, can come to any other conclusion than that one important element in the attainment of success is the scrupulous observance of the principles laid down as necessary to success in ovariotomy—not only as regards the hygienic precautions never omitted in modern surgery, but especially as to the importance of a very accurate and exact union, not only of the edges, but of the surfaces of the peritoneal surface of the viscera and of the abdominal wall. In gastrostomy, for instance, it is found that when the stomach is attached to the abdominal wall by a single ring of sutures, the weak attachment may give way, and risk of extravasation into the peritoneal cavity may be great. But when, after dividing the abdominal wall, the parietal peritoneum is sewn to the skin all round the opening, a broad surface of visceral and parietal peritoneum may afterwards be maintained in contact by a circle of sutures, forming loops, passed through the peritoneal coat of the protruding portion of stomach, and through the whole thickness of the abdominal wall, about half an inch from the edge of the incision. Smaller fine sutures being inserted between the

larger ones, a very close and secure attachment of the stomach to the peritoneal lined opening in the abdominal wall, and complete occlusion of the peritoneal cavity, are guaranteed. This done, we have an example of the carrying out in its integrity of one of the fundamental rules of practice in the operation of ovariotomy as regards the peritoneum—surface to surface, not edge to edge merely—and it is a fact not to be overlooked, that in gastrostomy the result of the operation seems to depend upon it; the rule being that the cases in which it has been neglected fail, while those in which it is observed end satisfactorily. Thus the lessons learnt at an early stage of our experience in one operation have been the means of leading directly to the successful performance of the other.'

In reference to the mode of operating, I need only say that the incision should be made about $\frac{3}{4}$ of an inch below the free margin of the cartilages of the 7th, 8th and 9th ribs on the left side. The liver is usually seen at the upper end of the incision, and is a good guide to the stomach, which is immediately beneath it. The centre of the anterior surface of the stomach is the part usually opened, but in the absence of some very immediate necessity for feeding by the stomach, it is better not to open it until a firm union of the peritoneal surfaces, kept together by the sutures, has been obtained. There can then be no fear of the escape of any of the contents of the stomach into the peritoneal cavity. When the opening is made, it need not be larger than is required for the passage of the feeding-tube.

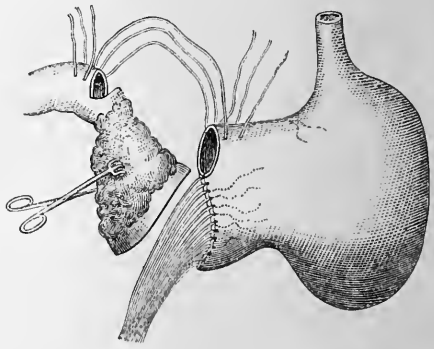
GASTROTOMY

or incision of the stomach, for the removal of a foreign body, has been performed successfully by Schönborn, and by Mr. Thornton, in order to extract masses of hair. In Mr. Thornton's case the mass weighed 2 pounds. It was moulded into the shape of the stomach. The incision across the greater curvature was 5 inches long. Fifteen deep sutures were passed through peritoneum, muscular coat, and edge of the mucous membrane. Fifteen superficial sutures were passed through the peritoneum only, and a very fine continuous suture over all united the opening in the coats of the stomach. The abdomen was closed as in ovariotomy, and the patient perfectly recovered.

Professor Loreta, of Bologna, has performed gastrotomy in order forcibly to dilate the pyloric orifice, by inserting first one index finger, then the other, and so effecting forcible dilatation, just as is done at the anus. In 1883 he published a monograph containing two successful cases. The opening in the coats of the stomach was closed by silk sutures, not more than 1 centimetre apart, including all the tissues of the coats. Using a long thread, armed at each end with a needle, he made a zigzag, or sort of glover's suture, each needle crossing alternately from left to right. The operation was done on account of non-malignant stricture. Loreta has since dilated the cardiac orifice of the stomach, in a case where contraction followed the destructive action of a caustic; and œsophageal bougies or tubes could not be passed.

EXCISION OF THE PYLORUS

A clear idea may be formed of pylorectomy by a glance at the accompanying woodcut, reduced from Wölfler's report of one of Billroth's cases. It shows very



clearly how the opening in the stomach, left after excision of the diseased part, has to be diminished, in order that it may correspond with the smaller opening of the intestine after the pylorus has been cut away. I have only twice seen a case where I thought this operation could be seriously advised. One patient was a captain of one of the Cunard steamers. He said he would submit to it after one more voyage to New York, but he died there; and I heard afterwards that the disease was so confined to the pylorus that the operation would have been very easy. The other

patient was a German tailor, who afterwards died in the Cancer Hospital; when it was found that the disease of the pylorus had just begun to involve the liver. Mr. Jennings tried to prolong life by injecting milk into a vein in his arm. Never having done the operation, however, I think it better to refer anyone proposing to do it to the works of Wölfler and Rydygier, and to Southam's account of a typical pylorectomy in the 'British Medical Journal' of July 1882, than to offer any description of my own. But I do think it right to insist that, before any surgeon attempts to excise the pylorus, or any portion of intestine or the uterus, he should make himself familiar with the details of the proceedings by practice on the dead body. At post-mortem examinations, whether in hospital or private practice, or in our workhouse infirmaries, opportunities may be obtained without any great difficulty for the practice of such operations. And I think it quite inexcusable for anyone who has neglected such opportunities to undertake, for the first time, such an operation upon any living patient before he has had some practice on the dead body.

INTESTINAL OBSTRUCTION

Operations upon the intestines, enterotomy, colotomy, resection of intestine, scarcely ever become subjects for consultation until either acute or chronic obstruction of intestine has produced symptoms dangerous to life. In cases of strangulated hernia, where a portion of intestine has become gangrenous, the removal of the gangrenous intestine, and the formation of an artificial anus, has been the orthodox practice for generations. It is only since the modern development of peritoneal surgery that abdominal section has been proposed in cases of intussusception, or as a mode of ascertaining the seat of obstruction in cases where it is doubted if the symptoms are due to a hernia-like strangulation through apertures, or by bands, or by adhesion of coils of intestine to each other, or by stricture, by compression of the intestine by tumours, or by new growths in the coats of intestines themselves, or by obstruction of the canal by gall-stones, fæcal masses or concretions, or by a paralytic or spasmodic condition of the bowel. The conflict between the surgery of the past and the present still goes on. We have not yet sufficient experience to enable us to lay down any such rules as shall prevent, on the one hand, too great haste in operating, and avoid, on the other, the dangers of delay too long continued.

I said in the address at Birmingham, from which I have already quoted, that in Mr. Treves's Jacksonian Prize Essay on Intestinal Obstruction, published last year, 'you will see how firmly an operator of to-day is taking his stand on the true principles of abdominal surgery which we have watched emerging from their obscurity. He does not ignore the teachings from experiments upon animals. He supports himself by the nine successful resections of lengths of the intestines of animals made by Madelung. He traces the failures in many operations of the same kind on the human subject to faults in the details, such as want of perfect adaptation and insufficiency of sutures. And he lays down as rules for his own action that he must separate the peritoneum from the other tissues—introduce abundance of sutures after Lembert's method—bringing the two serous surfaces together, and avoiding the mucous membrane with the needle. A recent paper by Reichel informs us that already 121 cases of resection of intestine have been collected, the conclusion being that the two ends of the bowel should *not* be united at the time of the resection, but that an artificial anus should be established. This can be closed by a subsequent operation.' Mr. Makins has had a successful case of artificial anus treated in St. Thomas's Hospital in 1884 by resection of more than 3 inches of small intestine, and suture of the upper and lower ends. His paper in the 13th volume of St. Thomas's Hospital Reports is a valuable contribution to modern surgery.

Mr. Jessop, of Leeds, has also cured a fæcal fistula by separating the injured intestine from the abdominal wall, and uniting the upper and lower parts of the gut by suture. What I said with regard to practice on the dead body before operating on living women is equally applicable to the resection of intestine. But here practice on the dead is not sufficient, and if we are not allowed to experiment on living animals in this country, we must either go abroad or practise on men and women. By my advice a young

surgeon, Mr. Jennings, from whom I hope and expect great things in the future, and who is already one of the junior surgeons of the Cancer Hospital, has recently cut away portions of the intestines of dogs, uniting the upper and lower parts so as to maintain the continuity of the canal. Some of the preparations may be seen in our College Museum, and they strongly confirm the conclusion that success depends upon complete union of the apposed serous surfaces. In order to prevent any blood or fæcal matter escaping from the divided intestine into the peritoneal cavity, clamps have been devised by Mr. Treves and Mr. Bishop to compress the upper and lower openings; and cylindrical plugs of dough or decalcified bone have been introduced to facilitate the introduction of the sutures. At my suggestion, Mr. Jennings, instead of solid plugs, used hollow cylinders of cocoanut butter and of gelatine. He had them cast in eight sizes, conical at the extremities.

Such cylinders afford a firm basis and support for the intestine during the operation, and will not collapse (like an india-rubber bag) if accidentally wounded by the point of the needle. The cylinders slowly melt during the first few hours after these operations, thus allowing time for adhesion of the peritoneal surfaces at the line of union, but not too slowly to form an obstacle to the passage of the fæces. The gelatine have the advantage of flexibility over the cocoa-butter cylinders.

So far as can be gathered from three experiments upon dogs, it appears:

1. That, whenever possible, the portion of intestine to be removed should be isolated from the general peritoneal cavity by passing it through a small aperture in a sheet of transparent gutta-percha tissue.

2. That the section of the intestine should be slightly oblique to lessen the tension on the line of suture, and to prevent the great diminution of the calibre of the intestine at the seat of resection, which obtains when the division is transverse.

3. That a triangular portion of the mesentery should be excised, the base corresponding to the part of the intestine which is removed.

4. That after the piece of intestine has been removed, a cylinder slightly larger than the calibre of the intestine should be selected, in order to distend the portions to be united.

5. That the gap in the mesentery should be closed by a continuous suture; and that a double row of intestinal sutures (each commencing where the mesentery joins the intestine) should be employed to maintain the peritoneal surfaces between the two rows in contact. The inner row should unite the edges of the pieces of the intestine: the outer row should include only peritoneum or peritoneum and muscularis. By this means sufficient peritoneal surfaces will be maintained in contact: but if only one row of sutures be employed, the edges of the intestine will curl away from each other, internal to that single line of sutures.

6. Fewer sutures should be employed for the inner than for the outer row, and the stitches in the latter should not be *more than one-tenth of an inch apart.*

7. A single continuous suture (for each row) should not be used; for if it be, when the intestine contracts after the operation, the ring of suture will not adapt itself to the lessened calibre of the intestine, and fæces will escape therefrom; whereas, if interrupted sutures be employed, when the intestine contracts, the points of suture will fall still closer together.

8. That Hageborn's flat needles are to be preferred, since they do not lacerate the peritoneum so much as the ordinary needles.

9. That silk, rendered antiseptic, should be used for the intestinal sutures: the braided, which will not kink, being better than the ordinary twist.

OPERATIVE TREATMENT OF PERITONITIS

At pages 331–33 of my work on Diseases of the Ovaries, which appeared in 1865, I have recorded a case of tubercular peritonitis, where recovery followed an exploratory incision and removal of peritoneal fluid. That patient is still quite well, 23 years after the operation, although 'the whole of the peritoneum was seen to be studded with myriads of tubercles,' and the colon and omentum with coils of small intestine were bound down, and all 'nodulated by tubercle.' I concluded by saying, 'The case would serve as a striking appendix to Marten's curious paper on the operative treatment

of peritonitis.' This paper may be found in the 20th volume of Virchow's 'Archiv.' published in 1861. Dr. Marten, of Hörde, there narrates two cases of what he calls '*empyema abdominis*' treated by abdominal section. And he argues that cases described as chronic peritonitis with exudation, or suppurative peritonitis, or of hæmorrhage into the peritoneal cavity, of effusion in puerperal peritonitis, of perforation of intestine, would be all better treated by abdominal section along the linea alba (he uses the word 'laparotomy') than by opium euthanasia. Cases may be found at long intervals in the medical journals bearing on these questions; but the first really important contribution is a paper by Marion Sims, in the 'British Medical Journal,' 1881–2, on 'The Treatment of Gunshot Wounds of the Abdomen, in Relation to modern Peritoneal Surgery.' In his usual strikingly interesting manner, Sims argues that 'ovariotomy is the parent of peritoneal surgery,' that 'other wounds of the peritoneum follow the same course as those made by the surgeon's knife in ovariotomy,' and that in all septicæmia is the chief danger. The time will come, he says, when 'gunshot and other wounds of the abdomen, and perforations of the intestine, will be treated by opening the peritoneal cavity, and washing out, or draining off, the septic fluids that would otherwise poison the blood.' In all cases of wounds of stomach, intestines, or bladder—in all cases of hæmorrhage into the peritoneal cavity, or of foreign bodies there, abdominal section should be the rule of treatment, followed by any sutures or ligatures that may be required, with such washing and drainage as the nature of the injury demands. In uniting wounds of the intestines Sims refers to the experiments of Gross, published in 1843, in favour of the continued suture of fine silk, and to his conclusion in 1872, that in all cases of wounded intestine, where there is no protrusion, the surgeon should 'enlarge the abdominal orifice, seek for the wounded tube, and sew up the cut,' and thoroughly cleanse the peritoneal cavity.

The next important paper on this subject is that of Mr. Treves, read at the Medical and Chirurgical Society in March 1855, 'On the Treatment of Acute Peritonitis by Abdominal Section.' Free incision and drainage, argued Mr. Treves, 'has been already applied for the relief of inflammations of certain of the serous membranes. It was at first adopted in connection with the smaller serous cavities, as those of the joints. It has been gradually and with increasing freedom applied in the treatment of inflammatory conditions involving the pleura. It has finally become a recognised means of treatment in certain forms of localised and chronic peritonitis, especially when purulent collections have formed. The author would urge the adoption of this principle in treatment in connection with acute and diffused forms of peritonitis.'

After relating a very successful case where acute diffused peritonitis was treated by incision, washing, and drainage, Mr. Treves advocates 'abdominal section in the treatment of certain cases of acute general peritonitis, such as that following injury, gunshot wound, the bursting of an abscess, and specified forms of perforation.'

All I need add to this is a caution against putting off the operation until too late—until the patient is dying of septicæmia.

CONCLUSION

It appearing that in a work on Abdominal Tumours it would be rather out of place to enter more fully upon the tempting theme of the operative treatment of obstructed intestine, or to do more than allude to the important subject of excision of the rectum, as this may be more or less an extra-peritoneal operation—a consideration which has also excluded an account of the operation of shortening the round ligaments in obstinate cases of uterine prolapse and flexions—I can only commend the careful study of Peritoneal Surgery to the Modern Student.

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